ICOM®

SERVICE MANUAL

VHF MARINE TRANSCEIVER

IC-M401E

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **IC-M401E** VHF MARINE TRANSCEIVER at the time of publication.
4 versions of the **IC-M401E** have been designed. This service manual covers each version.

MODEL	VERSION	SYMBOL
IC-M401E	UK, EUR, HOL, FRG	BLACK
	EUR-1	WHITE

To upgrade quality, anyelectrical or mechanical parts and internal circuits are subject to change without notice or obligation.

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 16 V. This will ruin the transceiver.

DO NOT expose the transceiver to rain, snow or any liquids.

DO NOT reverse the polarities of the power supply when connecting the transceiver.

DO NOT apply an RF signal of more than 20 dBm (100mW) to the antenna connector. This could damage the transceiver's front end.



ORDERING PARTS

Be sure to include the following four points when ordering replacement parts:

1. 10-digit order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

<**SAMPLE ORDER**>

1110003200 S.IC	TA31136FN	IC-M401E MAIN UNIT	5 pieces
8820001210 Screw	2438 screw	IC-M401E Chassis	12 pieces

Addresses are provided on the inside back cover for your convenience.

REPAIR NOTES

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated turning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB to 50 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

TABLE OF CONTENTS

SECTION 1 SPECIFICATIONS

■ GENERAL

• Frequency coverage	: 156.000–161.450 MHz (Tx) 156.000–163.425 MHz (Rx)
• Mode	: 16K0G3E (FM) 16K0G2B (DSC)
• Power supply requirement	: 13.8 V DC (negative ground)
• Usable temperature range	: –20˚C to +60˚C
• Frequency stability	: ±10 ppm (–20˚C to +60˚C)
• Current drain (at 13.8 V DC)	: Transmit at 25 W 5.5 A (max.) Receive max. audio 1.5 A (max.)
• Antenna impedance	: 50 Ω (nominal)
• Input impedance (MIC)	: 2 kΩ
• Output impedance (Audio)	: 4 Ω
• Dimensions (projections not included)	: 153(W)×67(H)×141.6(D) mm
• Weight (approx.)	: 950 g

■ TRANSMITTER

• Output power (at 13.8 V DC)	: High 25 W Low 1 W
• Modulation	: Variable reactance frequency modulation
• Maximum frequency deviation	: ±5.0 kHz
• Spurious emissions	: Less than 0.25 μW
• Adjacent channel power	: More than 70 dB
• Residual modulation	: More than 40 dB
• Audio harmonic distortion	: Less than 10% at 60% deviation
• Audio frequency response	: +1 dB to –3 dB of 6 dB octave from 300 Hz to 3000 Hz

■ RECEIVER

• Receive system	: Double conversion superheterodyne system
• Intermediate frequencies	: 1st 21.7 MHz 2nd 450 kHz
• Sensitivity	: Less than –2 dBμ emf typical at 20 dB SINAD
• Squelch sensitivity	: Less than 0 dBμ emf typical
• Adjacent channel selectivity	: More than 70 dB
• Spurious response	: More than 70 dB
• Intermodulation rejection ratio	: More than 70 dB
• Hum and noise	: More than 40 dB
• Audio frequency response	: +1 dB to –3 dB of –6 dB octave from 300 Hz to 3000 Hz

Specifications are measured in accordance with EN301 025-2, -3

All stated specifications are subject to change without notice or obligation.

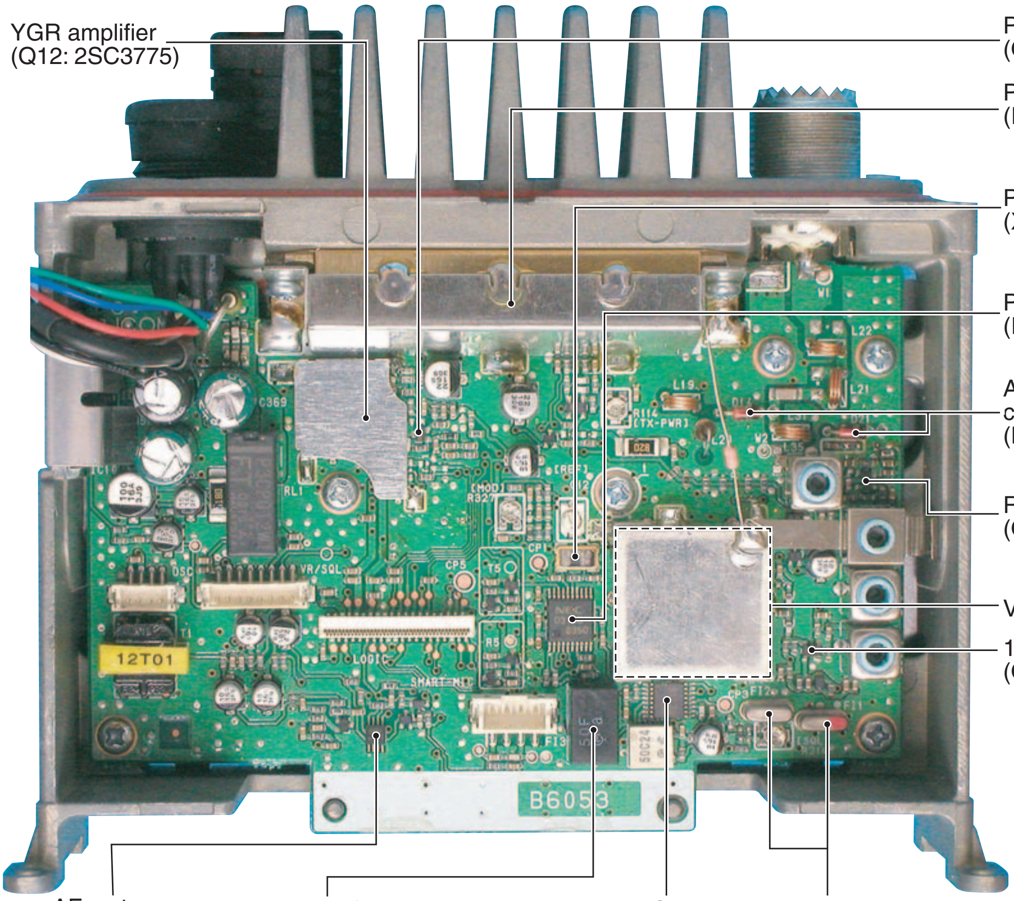
■ VHF MARINE CHANNEL LIST

Channel No.		Frequency (MHz)		Channel No.		Frequency (MHz)		Channel No.		Frequency (MHz)	
USA *2	INT	Transmit	Receive	USA *2	INT	Transmit	Receive	USA *2	INT	Transmit	Receive
	01	156.050	160.650		22	157.100	161.700	74	74	156.725	156.725
01A		156.050	156.050	22A		157.100	157.100		75*1	156.775	156.775
	02	156.100	160.700		23	157.150	161.750		76*1	156.825	156.825
	03	156.150	160.750	23A		157.150	157.150	77*1	77	156.875	156.875
03A		156.150	156.150	24	24	157.200	161.800		78	156.925	161.525
	04	156.200	160.800	25	25	157.250	161.850	78A		156.925	156.925
	05	156.250	160.850	26	26	157.300	161.900		79	156.975	161.575
05A		156.250	156.250	27	27	157.350	161.950	79A		156.975	156.975
06	06	156.300	156.300	28	28	157.400	162.000		80	157.025	161.625
	07	156.350	160.950	37A	37A*2	157.850	157.850	80A		157.025	157.025
07A		156.350	156.350		60	156.025	160.625		81	157.075	161.675
08	08	156.400	156.400		61	156.075	160.675	81A		157.075	157.075
09	09	156.450	156.450	61A		156.075	156.075		82	157.125	161.725
10	10	156.500	156.500		62	156.125	160.725	82A		157.125	157.125
11	11	156.550	156.550		63	156.175	160.775		83	157.175	161.775
12	12	156.600	156.600	63A		156.175	156.175	83A		157.175	157.175
13*	13	156.650	156.650		64	156.225	160.825	84	84	157.225	161.825
14	14	156.700	156.700	64A		156.225	156.225	84A		157.225	157.225
15*1	15*1	156.750	156.750		65	156.275	160.875	85	85	157.275	161.875
16	16	156.800	156.800	65A		156.275	156.275	85A		157.275	157.275
17*1	17*1	156.850	156.850		66	156.325	160.925	86	86	157.325	161.925
	18	156.900	161.500	66A		156.325	156.325	86A		157.325	157.325
18A		156.900	156.900	67*	67	156.375	156.375	87	87	157.375	161.975
	19	156.950	161.550	68	68	156.425	156.425	87A		157.375	157.375
19A		156.950	156.950	69	69	156.475	156.475	88	88	157.425	162.025
20	20	157.000	161.600	70	70	Rx only	156.525	88A		157.425	157.425
20A		157.000	157.000	71	71	156.575	156.575				
	21	157.050	161.650	72	72	156.625	156.625				
21A		157.050	157.050	73	73	156.675	156.675				

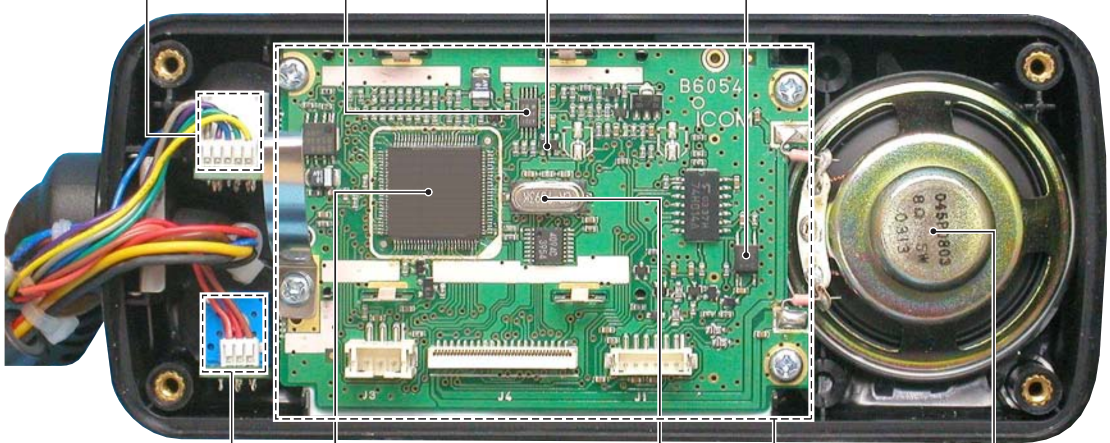
*1 Low power only, *2 For [UK] version only

SECTION 2 INSIDE VIEWS

• MAIN-E UNIT



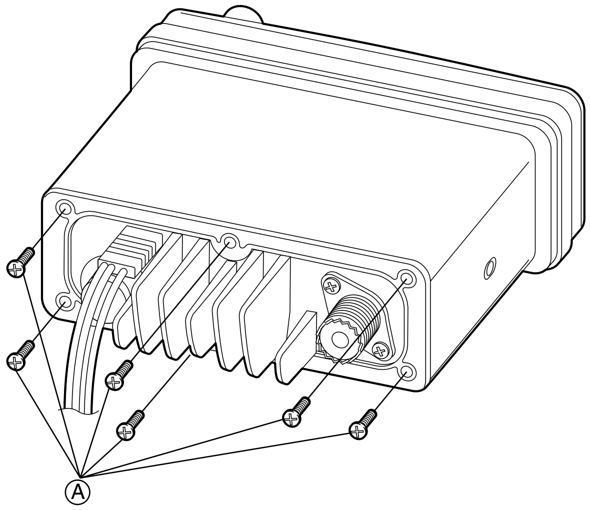
• FRONT UNIT



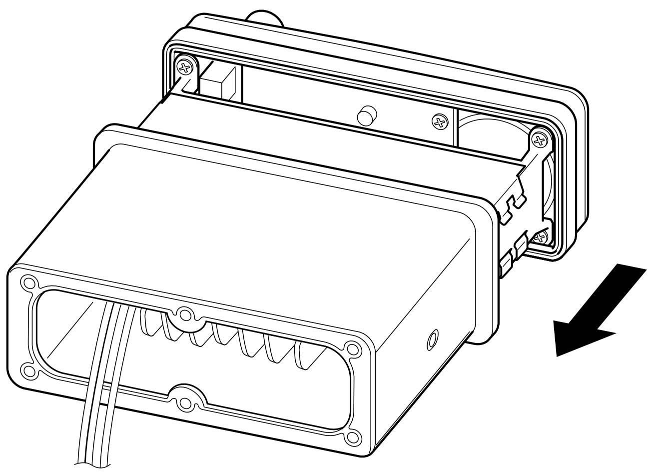
SECTION 3 DISASSEMBLY INSTRUCTIONS

• REMOVING THE CASE

❶ Unscrew 6 screws, Ⓐ.
Note: When replacing the screw, 10–12 kg of torque MUST be applied to ensure water resistance.

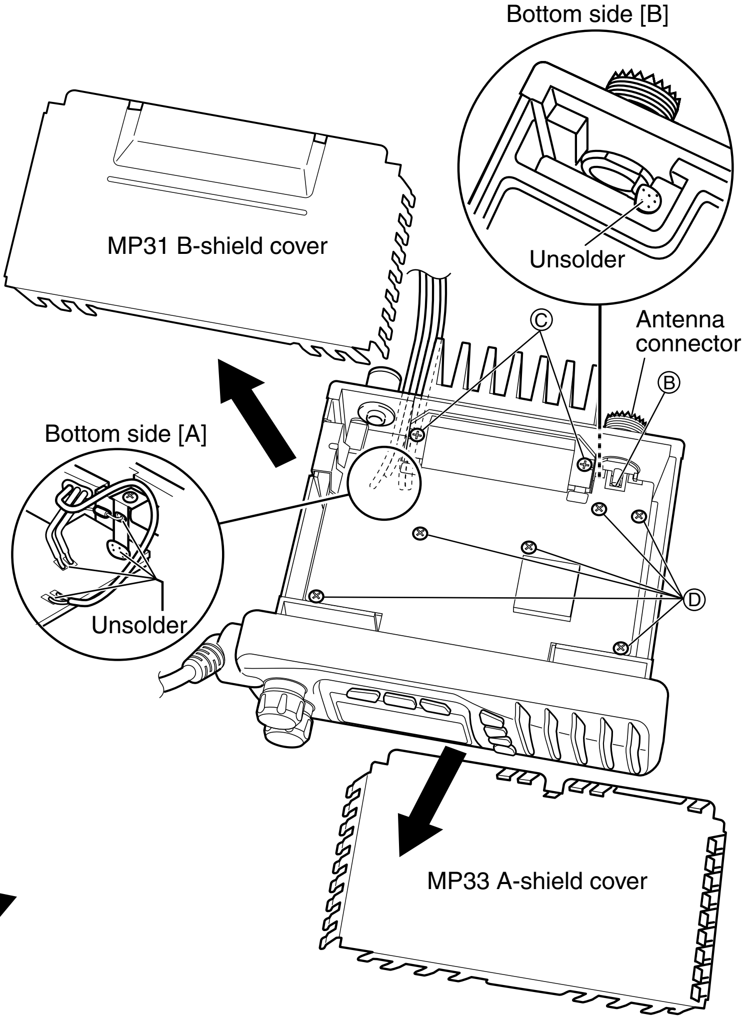


❷ Slide the case free of the chassis in the direction of the arrow.



• REMOVING THE MAIN-E UNIT

❶ Remove the shield covers, MP31 and MP33.
❷ Unsolder the antenna connector, Ⓑ (1 point).
❸ Unsolder bottom side [A] (6 points), and side [B] (1 point), as shown below.
❹ Unscrew 2 screws, Ⓒ, and 6 screws, Ⓓ, to remove the MAIN-E unit.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT (MAIN-E UNIT)

The antenna switching circuit functions as a low-pass filter while receiving and as resonator circuit while transmitting. The circuit does not allow transmit signals to enter receiver circuits.

Received signals enter the MAIN-E unit from the antenna connector and pass through the low-pass filter (L21, L22, C127, C130, C133). The signals are then applied to the RF circuit via the antenna switching circuit (D14, D21, L31, C141, C142).

4-1-2 RF CIRCUIT (MAIN-E UNIT)

The RF circuit amplifies signals within the range of frequency coverage and filters out-of-band signals.

The signals from the antenna switching circuit pass through a tunable bandpass filter (D25, L35, C150, C152) where the object signals are applied to the RF amplifier circuit (Q21).

The amplified signals at Q21are applied to the 3-stage tunable bandpass filter (D26-D28, L36, L38, L39, C161, C162, C164, C173-C178) to suppress unwanted signals and improve the selectivity. The signals are then applied to the 1st mixer circuit (Q22).

4-1-3 1ST MIXER AND 1ST IF CIRCUITS (MAIN-E UNIT)

The 1st mixer circuit converts the received signal to a fixed frequency of the 1st IF signal with a 1st LO (VCO output) frequency. By changing the 1st LO frequency, only the desired frequency will be passed through two crystal filters at the next stage of the mixer.

The signals from the RF circuit are mixed with the VCO signals at the 1st mixer circuit (Q22) to produce a 21.7 MHz 1st IF signal.

The 1st IF signal is applied to two crystal filters (FI1, FI2) to suppress out-of-band signals and is then amplified at the IF amplifier (Q23). The amplified signal is applied to the 2nd mixer circuit (IC2).

4-1-4 2ND IF AND DEMODULATOR CIRCUITS (MAIN-E UNIT)

The 2nd mixer circuit converts the 1st IF signal to a 2nd IF signal. A double superheterodyne system (which converts receive signals twice) improves the image rejection ratio and obtains stable receiver gain.

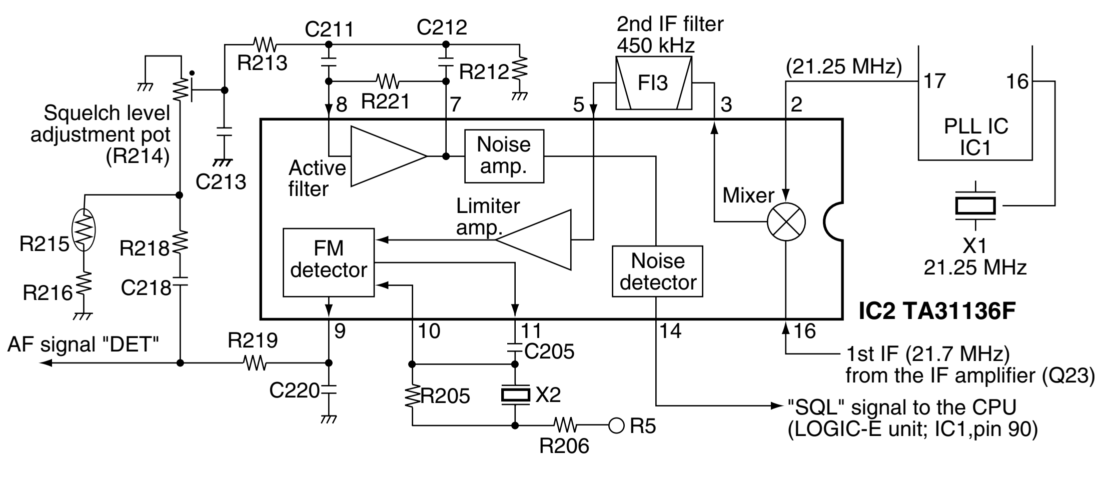
The FM IF IC (IC2) contains the 2nd local oscillator, 2nd mixer, limiter amplifier, quadrature detector, and noise detector circuits, etc.

The 1st IF signal from Q23 is applied to the 2nd mixer section of IC2 (pin 16), and is mixed with a 21.25 MHz 2nd LO signal generated at the PLL circuit using the reference frequency (21.25 MHz) to produce a 450 kHz 2nd IF signal.

The 2nd IF signal from IC2 (pin 3) is passed through the ceramic filter (FI3), where unwanted signals are suppressed, and is then applied to the 2nd IF (limiter) amplifier in IC2 (pin 5). The signal is applied to the FM detector section in IC2 for demodulation into AF signals.

The FM detector circuit employs a quadrature detection method (linear phase detection), which uses a ceramic discriminator (X2) for phase delay to obtain a non-adjusting circuit. The detected signal from IC2 (pin 9) is applied to the AF circuit.

• 2ND IF AND DEMODULATOR CIRCUITS



4-1-5 AF AMPLIFIER CIRCUIT (MAIN-E AND FRONT UNITS)

The AF amplifier circuit amplifies the detected signals to drive a speaker. The AF circuit includes an AF mute circuit for the squelch.

AF signals from IC2 (pin 9) are applied to the de-emphasis circuit (R231, C232). The de-emphasis circuit is an integrated circuit with frequency characteristic of –6 dB/octave.

The integrated signals pass through the bandpass filter (Q31, R232, R234–R237, C233, C234) to suppress unwanted noise signals.

The filtered signals are applied to the AF mute circuit (IC4), and then passes through the [VOLUME] control (VR board; R1) via the “VOL1” signal. The signals are applied to the AF power amplifier (IC9, pin 1). The output signal from IC9 (pin 4) drives the internal (external) speaker.

4-1-6 SQUELCH CIRCUIT (MAIN-E UNIT)

A squelch circuit cuts out AF signals when no RF signals are received. By detecting noise components in the AF signals, the squelch circuit switches the AF mute switch.

A portion of the AF signals from the FM IF IC (IC2, pin 9) pass through the squelch adjustment pot (R214), and are then applied to the active filter section (IC2, pin 8). The active filter section filters and amplifies noise components. The amplified signals are converted into the pulse-type signals at the noise detector section. The detected signals outputs from pin 14 as the “SQL” signal.

The “SQL” signal from the FM IF IC is applied to the CPU (LOGIC-E board; IC1, pin 90). The CPU analyzes the noise condition and outputs as the “RMUTM” signal to the AF mute switch (IC4).

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT (MAIN-E UNIT)

The microphone amplifier circuit amplifies audio signals with +6 dB/octave pre-emphasis from the microphone to a level needed at the modulation circuit.

The AF signals from the microphone are amplified at the microphone amplifier (IC7, pins6, 7) via the analog switch (IC4, pins 5, 6). A capacitor (C302) and resistor (R303) are connected to the amplifier to obtain the pre-emphasis characteristics.

The amplified signals are passed through the MIX circuit (IC7, pins 1, 2) to do amplitude limiting, and are then applied to the splatter filter (IC8, pins 1, 3) to suppress unwanted 3 kHz or higher signals. The filtered signals are then applied to the modulation circuit.

4-2-2 MODULATION CIRCUIT (MAIN-E UNIT)

The modulation circuit modulates the VCO oscillating signal (RF signal) using the microphone audio signals.

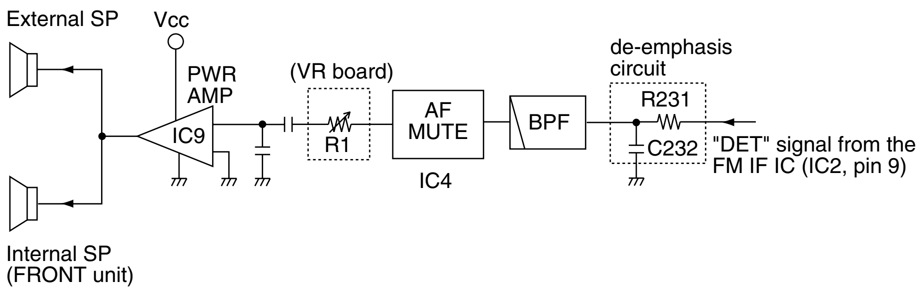
Audio signals from the splatter filter (IC8, pins 1, 3) pass through the frequency deviation adjustment pot (R327) and are then applied to the modulation circuit (D3, D4) to change the reactance of D3, D4 and modulate the oscillated signal at the VCO (Q4, Q5).

4-2-3 DRIVE AMPLIFIER CIRCUIT (MAIN-E UNIT)

The drive amplifier circuit amplifies the VCO oscillating signal to a level needed at the power amplifier.

The VCO output is buffer-amplified by Q6 and Q7, and is then applied to the Tx/Rx switch (D7). The transmit signal from the Tx/Rx switch is amplified to the pre-drive (Q10) and YGR (Q12) amplifiers to obtain an approximate 50 mW signal level. The amplified signal is then applied to the RF power amplifier (IC3).

• AF AMPLIFIER CIRCUIT



4-2-4 POWER AMPLIFIER CIRCUIT (MAIN-E UNIT)

The power amplifier circuit amplifies the driver signal to an output power level.

IC3 is a power module which has amplification output capabilities of about 35 W with 50 mW input. The output from IC3 (pin 4) is passed through the antenna switching circuit (D14) and is then applied to the antenna connector via the low-pass filter.

4-2-5 APC CIRCUIT (MAIN-E UNIT)

The APC circuit stabilizes transmit output power.

The RF output signal from the power amplifier (IC3; pin 4) is detected at the power detector circuit (D12, D13, L19, C121, C124) and is then applied to one of the differential amplifier inputs (Q16, pin 5) via the High/Low control circuit (Q17, R114). The applied voltage controls the differential amplifier output (Q16, pin 2) and the bias voltage control (Q13). Thus the APC circuit maintains a constant output power.

4-3 PLL CIRCUITS

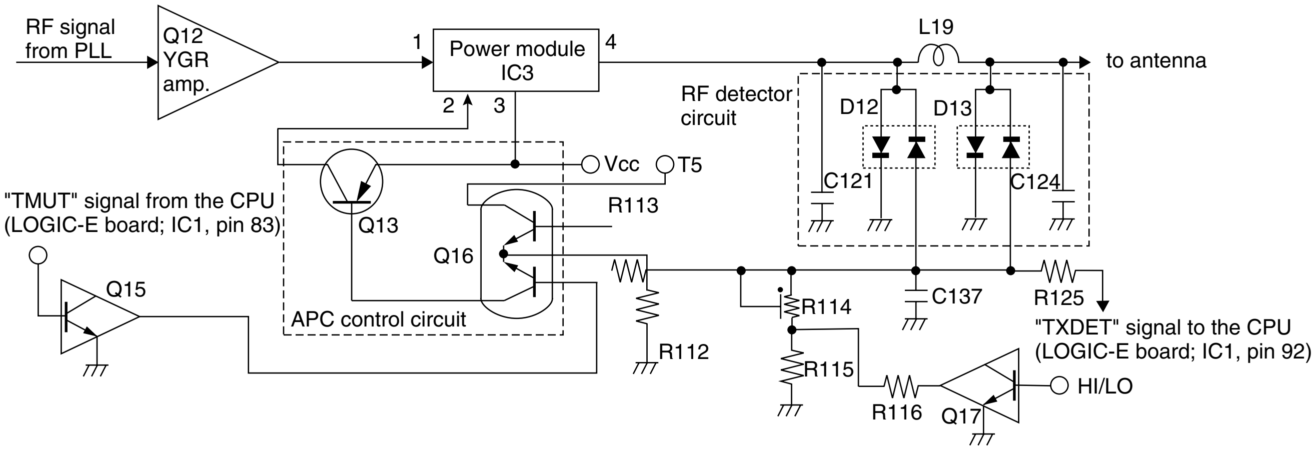
4-3-1 GENERAL

The PLL circuit provides stable oscillation of the transmit frequency and receive 1st LO frequency. The PLL circuit compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by a crystal oscillator and the divided ratio of the programmable divider.

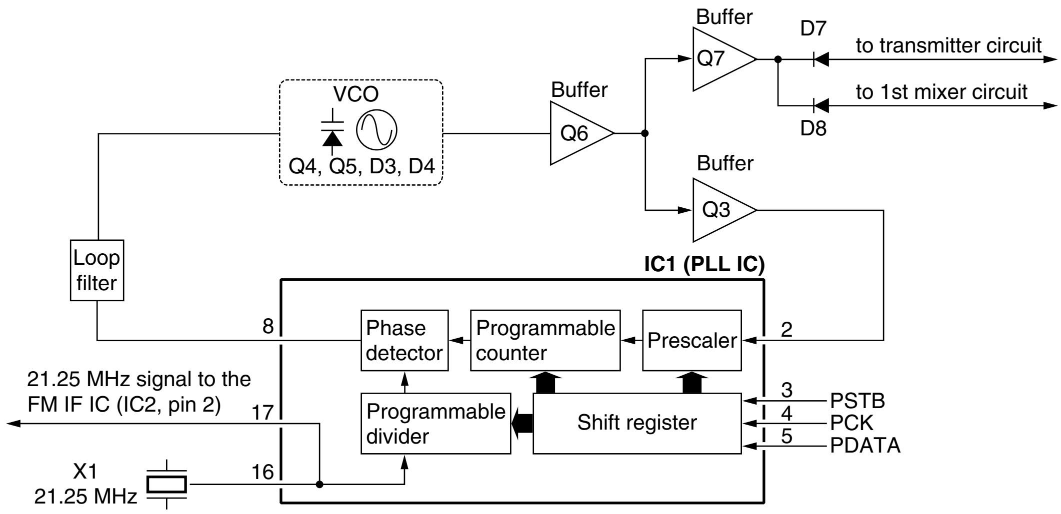
IC1 on the MAIN-E unit is a dual PLL IC which controls both VCO circuits for Tx and Rx, and contains a prescaler, programmable counter, programmable divider, phase detector, charge pump, etc.

The PLL circuit, using a one chip PLL IC (MAIN-E unit; IC1), directly generates the transmit frequency and receive 1st IF frequency with VCOs. The PLL sets the divided ratio based on serial data from the CPU on the LOGIC-E board and compares the phases of VCO signals with the reference oscillator frequency. The PLL IC detects the out-of-step phase and output from pins 8 for Tx and Rx. The reference frequency (21.25 MHz) is oscillated at X1 (MAIN-E unit).

• APC CIRCUIT



• PLL CIRCUIT



4-3-2 TX AND RX LOOP (MAIN-E UNIT)
The generated signal at the VCO (Q4, Q5, D3, D4) enters the PLL IC (IC1, pin 2) and is divided at the programmable divider section and is then applied to the phase detector section.

The phase detector compares the input signal with a reference frequency, and then outputs the out-of-phase signal (pulse-type signal) from pin 8.

The pulse-type signal is converted into DC voltage (lock voltage) at the loop filter (R7–R9, R41, C4, C5, C43, C44), and is then applied to varactor diodes (D3, D4) of the VCO to stabilize the oscillated frequency.

4-3-4 VCO CIRCUIT (MAIN-E UNIT)
The VCO outputs from Q4, Q5 are buffer-amplified at the buffer amplifiers (Q6 and Q7), and are then sent to the Tx/Rx switch (D7 and D8). The receive LO signal is applied to the 1st mixer circuit (Q22) through a low-pass filter, and the transmit signal is applied to the pre-drive amplifier (Q10). A portion of the VCO output is reapplied to the PLL IC (IC1, pin 2) via the buffer amplifier (Q3).

4-4 ATIS AND DSC CIRCUITS
4-4-1 ATIS ENCODE CIRCUIT (LOGIC-E BOARD AND MAIN-E UNIT)
The FSK signal of ATIS created at CPU (LOGIC-E board; IC1) is passed through the ladder type D/A convertor (R41–R56) to convert into the analog signal. The analog signal is applied to the buffer amplifier (LOGIC-E board; IC9), and then applied to the mixer circuit (MAIN-E unit; IC7, pins 1, 2) to mix with signals from the microphone. The signal passes through the low-pass filter (MAIN-E unit; IC8, pins 1, 3) and is then applied to the VCO circuit as modulation signal.

4-4-2 DSC ENCODE CIRCUIT (MAIN-E UNIT)
The DSC signal created at the optional DSC controller (DS-100) is applied to the T1 via the J7, and then as floating system output. The signal is applied to the buffer amplifier (Q61), and then passes through the 6 dB/oct pre-emphasis circuit (R417, C416). The signal is applied to the mixer circuit (IC7, pins 1, 2) to mix with signals from the microphone. The signal passes through the low-pass filter (IC8, pins 1, 3) and is then applied to the VCO circuit as modulation signal.

4-5 LOGIC CIRCUITS (LOGIC-E BOARD)
• CPU
IC1 is an 8 bit signal chip micro-computer and contains LCD driver, serial I/O, timer, A/D converter, programmable I/O, ROM and RAM.

• SYSTEM CLOCK CIRCUIT
X1 is a ceramic oscillator and oscillate 9.8304 MHz system clock for the CPU (IC1).

• RESET CIRCUIT
IC2 is a reset IC. When turn power ON, IC2 outputs a reset signal (“LOW” pulse) to the CPU (IC1, pin 15) via the “RES” line.

• LOW BATTERY DETECTOR
VCC voltage is divided by R84, R85 and is applied to the low battery detector section in the CPU (IC1, pin 91) via the “LBAT” line.

• DIMMER CIRCUIT
The CPU (IC1), Q1, Q2 and Q3 are dimmer circuit and control the 4 steps the LCD backlight (DS2–DS7).

4-6 POWER SUPPLY CIRCUITS
VOLTAGE LINES

LINE	DESCRIPTION
HV	The voltage from the connected DC power supply.
HVS	Same voltage as the HV line which is passed through the [PWR] switch (VR unit; R1).
VCC	Same voltage as the HVS line. The voltage is applied to the optional DSC controller (DS-100).
5V	Common 5 V converted from the VCC line at the 5V regulator circuit (MAIN-E unit; IC10).
T5	Transmit 5 V controlled by the T5 control circuit (MAIN-E unit; Q52, Q57) using the “SEND” signal from the CPU (LOGIC-E board; IC1). The controlled voltage is applied to the transmitter circuit.
R5	Receive 5 V controlled by the R5 control circuit (MAIN-E unit; Q53, Q54) using the “RCV” signal from the CPU (LOGIC-E board; IC1). The controlled voltage is applied to the receiver circuit.
R8	Receive 8 V controlled by the R5 control circuit (MAIN-E unit; Q55, Q56) using the “R5” signal. The controlled voltage is applied to the receiver circuit.

4-7 PORT ALLOCATIONS

4-7-1 CPU (LOGIC-E BOARD; IC1)

Pin number	Port name	Description
1 2	CONT1 CONT2	Outputs control signal for the LCD contrast.

CONT1	CONT2	CONTRAST
0	0	LIGHT
1	1	DEEP

Pin number	Port name	Description
3	BEEPM	Outputs beep audio signal.
5	CH16	Input port for the CH16 switch. Low: While CH16 switch is pushed.
6	CH	Input port for the CH switch. Low: While CH switch is pushed.
7	H/L	Input port for the H/L switch. Low: While H/L switch is pushed.
8	HANG	Input port for the MIC hanging signal. Low: While MIC is pull-up.
16	PCK	Outputs clock signal to the PLL IC (MAIN-E unit; IC1, pin 4).
17	PSTB	Outputs strobe signals to the PLL IC (MAIN-E unit; IC1, pin 3).
18	PDATA	Outputs data signals to the PLL IC (MAIN-E unit; IC1, pin 5).
20	ICFC	Outputs control signal to switch NMEA or ICF3.
21	BPLVL	Outputs beep volume control signal. Low: Beep audio is maximum.
22	ECK	Outputs clock signal for the EEPROM (LOGIC-E board; IC2, pin 6).
23	EDA	I/O port for the EEPROM data signals.
27	HI/LO	Output port for RF output power (High or Low) select signal.
28	RRXD	Input port for the cloning data.
29	RTXD	Output port for the cloning data.
31	BPFV	Outputs bandpass filter select signals. Low: Receiving more than 160 MHz. High: Receiving less than 160 MHz.
83	TMUT	Outputs transmit mute signal. High: While transmitting.
84	NMEAI	Input port for DS-100 data.
89	SQLV	Input port for the squelch volume level.
90	SQL	Input port from the FM IF IC (MAIN-E unit; IC2) for the squelch operation.
91	LBAT	Input port for the connected power supply voltage detection (low battery indicator).
92	TXDET	Input port for TX LED control signal.
93	KEYM	Input port for the HM-132 functions. 2.02 V: [▲] is pushed. 3.00 V: [▼] is pushed. 3.84 V: [16/C] is pushed.
94	PTT	Input port for the PTT switch from HM-132. Low: While PTT is pushed.
95	TAG	Input port for the TAG switch. Low: While TAG switch is pushed.
96	SCN	Input port for the SCN switch. Low: While SCN switch is pushed.
97	UP	Input port for the UP switch. Low: While UP switch is pushed.
98	DN	Input port for the DOWN switch. Low: While DOWN switch is pushed.
99	UNLK	Input port for the PLL unlock signal. Low: While PLL is locked.

4-7-2 I/O EXPANDER IC (LOGIC-E BOARD; IC3)

Pin number	Port name	Description
4	RMUTM	Outputs the AF mute switch (MAIN-E unit; IC4) control signal. Low: While squelched
6	PTTM	Outputs main microphone (HM-132) select signal to the analog switch (MAIN-E unit; IC4).
13	SEND	Outputs the T5 regulator (MAIN-E unit; Q52, Q57) control signal. High: While transmitting
14	RCV	Outputs the R5 regulator (MAIN-E unit; Q53, Q54) control signal. High: While receiving.

SECTION 5 ADJUSTMENT PROCEDURES

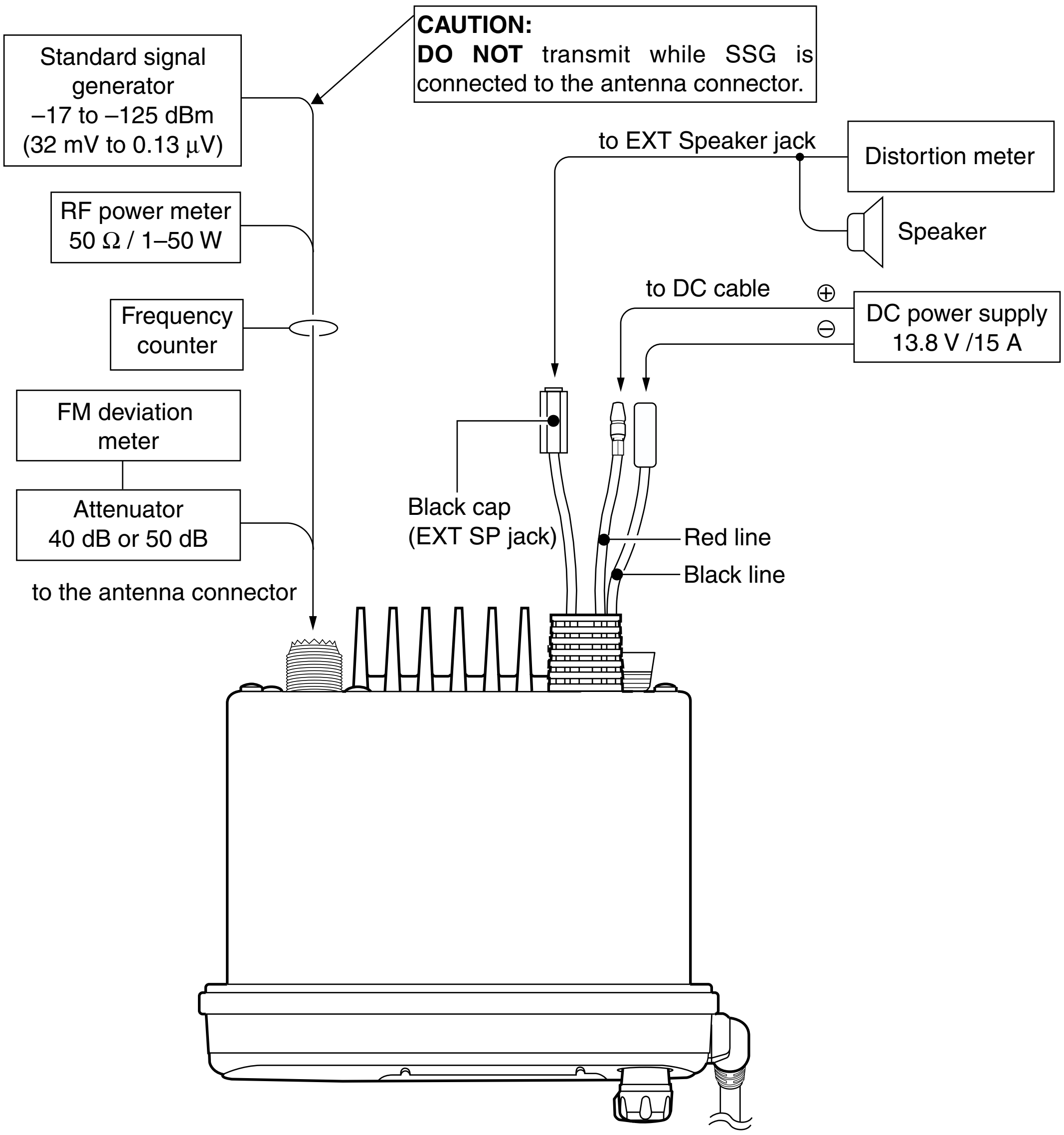
5-1 PREPARATION

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 13.8 V DC Current capacity : 10 A or more
RF power meter (terminated type)	Measuring range : 1–50 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1
Frequency counter	Frequency range : 0.1–300 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better
FM deviation meter	Frequency range : 30–300 MHz Measuring range : 0 to ±10 kHz
DC voltmeter	Input impedance : 50 kΩ/V DC or better
Digital multi-meter	Input impedance : 10 MΩ/V DC or better
Distortion meter	Frequency range : 1 kHz ±10 % Measuring range : 1–100 %

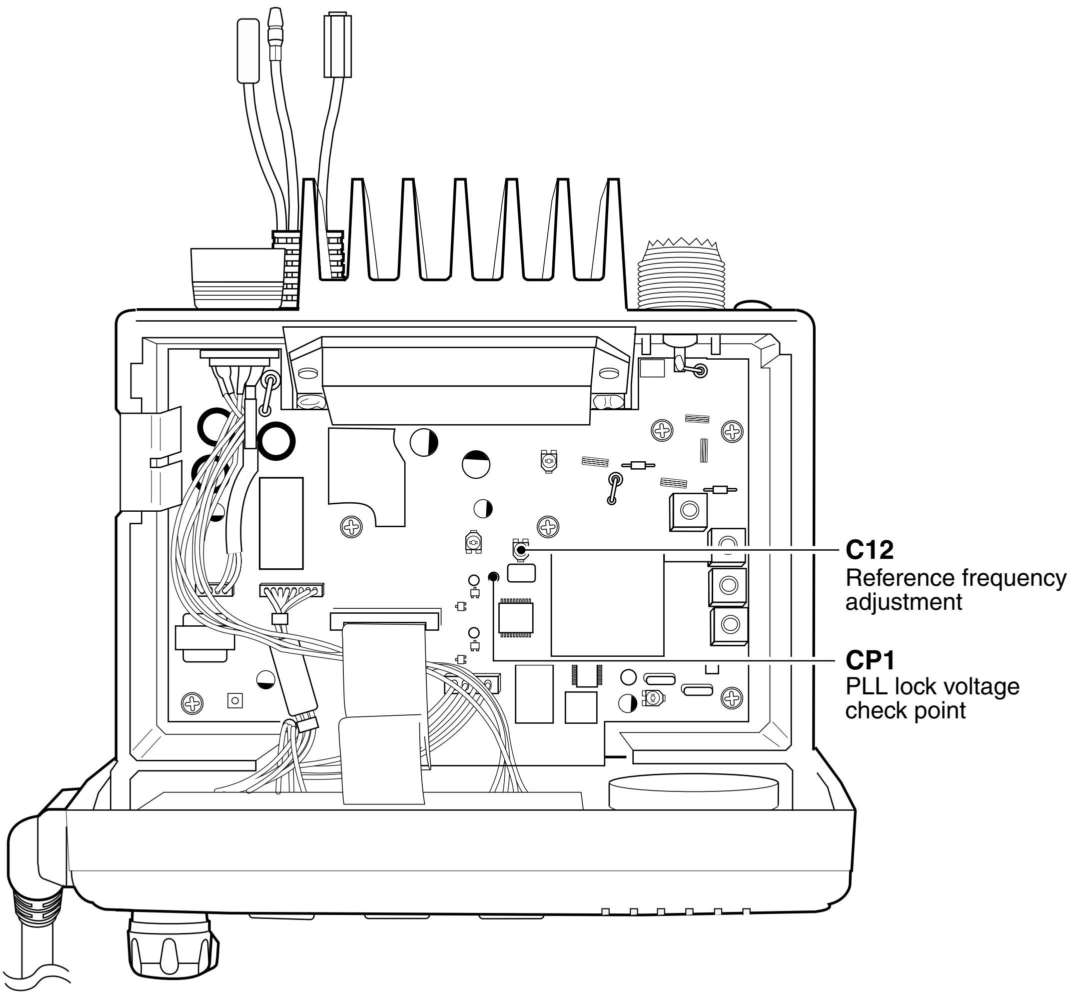
EQUIPMENT	GRADE AND RANGE
Audio generator	Frequency range : 300–3000 Hz Measuring range : 1–500 mV
Standard signal generator (SSG)	Frequency range : 0.1–300 MHz Output level : 0.1 μV–32 mV (–127 to –17 dBm)
Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
AC millivoltmeter	Measuring range : 10 mV–10 V
External speaker	Input impedance : 4 Ω Capacity : 5 W or more
Attenuator	Power attenuation : 40 or 50 dB Capacity : 50 W or more
Dummy load	Resistance : 50 Ω Capacity : 100 W or more

■ CONNECTIONS



5-2 PLL ADJUSTMENTS

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
LOCK VOLTAGE	1	• Operating channel : ch16 • Receiving	MAIN-E	Connect a digital multi-meter or oscilloscope to the check point CP1.	1.8 V		Verify
	2	• Operating channel : ch16 • Output power : Low • Transmitting			1.6 V		
REFERENCE FREQUENCY	1	• Operating channel : ch16 • Output power : Low • Connect an RF power meter or a 50 Ω dummy load to the antenna connector. • Transmitting	Rear Panel	Loosely couple the frequency counter to the antenna connector.	156.8000 MHz	MAIN	C12



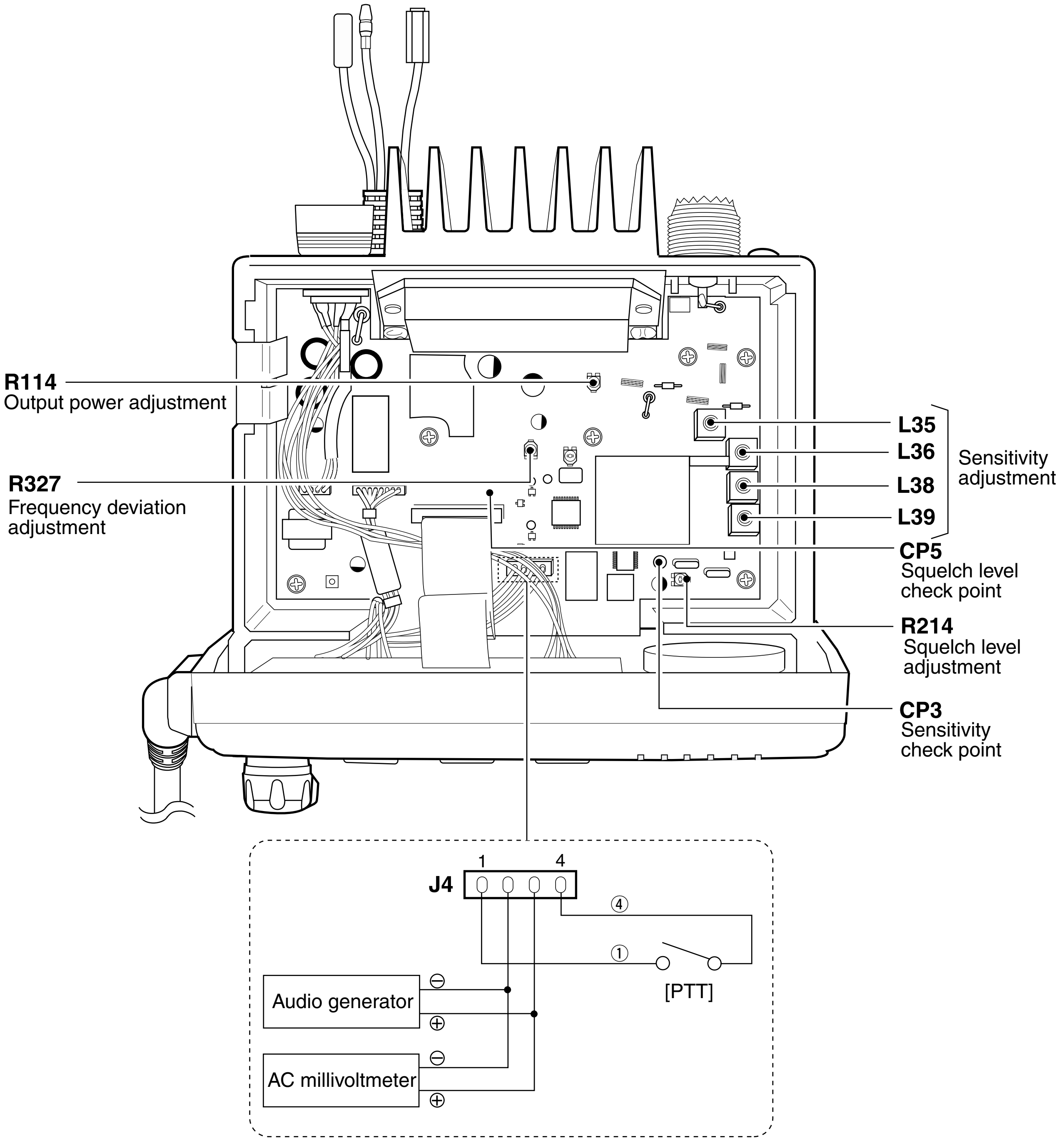
5-3 TRANSMITTER ADJUSTMENTS

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER	1	• Operating channel : ch16 • Output power : High • Transmitting	Rear Panel	Connect an RF power meter to the antenna connector.	23 W	MAIN	R114
FREQUENCY DEVIATION	1	• Operating channel : ch16 • Output power : Low • Connect an audio generator to J4 (pin 3) on the MAIN-E unit with an AC millivoltmeter and set as: Frequency : 1 kHz Level : 30 mV • Set an FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • Transmitting	Rear Panel	Connect an FM deviation meter to the antenna connector through an attenuator.	±4.3 kHz	MAIN	R327

5-4 RECEIVER ADJUSTMENTS

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	1	• Operating channel : ch16 • [SQUELCH] control : Max. counterclockwise • Connect an SSG to the antenna connector and set as: Frequency : 156.800 MHz Level : 3.2 μV* (–97 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz • Receiving	MAIN-E	Connect a DC voltmeter to the check point CP3.	Maximum voltage	MAIN-É	L35, L36 L38, L39
SQUELCH	1	• Operating channel : ch16 • [SQUELCH] control : Max. counterclockwise • Connect an SSG to the antenna connector and set as: Frequency : 156.800 MHz Level : 0.4 μV* (–115 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz • Receiving	MAIN-E	Connect a DC voltmeter to the check point CP5.	0.8 V	MAIN-E	R214

*This output level of a standard signal generator (SSG) is indicated as SSG's open circuit.


R114
Output power adjustment
R327
Frequency deviation
adjustment
L35
L36
L38
L39
Sensitivity
adjustment
CP5
Squelch level
check point
R214
Squelch level
adjustment
CP3
Sensitivity
check point
J4
1
4
④
①
[PTT]
Audio generator
AC millivoltmeter
⊖
⊕
⊖
⊕

SECTION 6 PARTS LIST

6-1 IC-M401E

[MAIN-E UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
IC1	1130007610	S.IC	μPD3140GS-E1 (DS8)	T
IC2	1110003200	S.IC	TA31136FN (EL)	T
IC3	1150002080	IC	RA35H1516M-01	T
IC4	1130007300	S.IC	TC4W66FU (TE12L)	T
IC7	1110000960	S.IC	NJM4558M-T1	B
IC8	1110000960	S.IC	NJM4558M-T1	B
IC9	1110003090	IC	LA4425A	T
IC10	1110002020	IC	TA7805S	T
IC11	1120002830	S.IC	NJM2125F-TE1	B
Q1	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	T
Q2	1590000430	S.TRANSISTOR	DTC144EUA T106	B
Q3	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)	T
Q4	1530002920	S.TRANSISTOR	2SC4226-T1 R25	T
Q5	1530002920	S.TRANSISTOR	2SC4226-T1 R25	T
Q6	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)	T
Q7	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)	T
Q10	1530002920	S.TRANSISTOR	2SC4226-T1 R25	T
Q12	1530002240	S.TRANSISTOR	2SC3775-3-TB	T
Q13	1510000920	S.TRANSISTOR	2SA1577 T106 Q	T
Q15	1590000430	S.TRANSISTOR	DTC144EUA T106	T
Q16	1590000670	S.TRANSISTOR	FMW1 T148	T
Q17	1590000430	S.TRANSISTOR	DTC144EUA T106	B
Q21	1580000540	S.FET	3SK131-T2-LA	T
Q22	1580000540	S.FET	3SK131-T2-LA	T
Q23	1530002360	S.TRANSISTOR	2SC2714-Y (TE85R)	B
Q31	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	T
Q34	1590000430	S.TRANSISTOR	DTC144EUA T106	T
Q41	1590000430	S.TRANSISTOR	DTC144EUA T106	B
Q51	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)	T
Q52	1590000430	S.TRANSISTOR	DTC144EUA T106	T
Q53	1510000920	S.TRANSISTOR	2SA1577 T106 Q	T
Q54	1590000430	S.TRANSISTOR	DTC144EUA T106	T
Q55	1520000460	S.TRANSISTOR	2SB1132 T100 R	T
Q56	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	T
Q61	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	B
D1	1790000620	S.DIODE	MA77 (TX)	B
D2	1790000620	S.DIODE	MA77 (TX)	B
D3	1750000710	S.VARICAP	HVC350BTRF	T
D4	1750000710	S.VARICAP	HVC350BTRF	T
D7	1790000620	S.DIODE	MA77 (TX)	B
D8	1790000620	S.DIODE	MA77 (TX)	B
D12	1790000690	S.DIODE	HSM88ASR-TR	B
D13	1790000690	S.DIODE	HSM88ASR-TR	B
D14	1710001080	DIODE	XB15A308	T
D21	1710001080	DIODE	XB15A308	T
D24	1790001210	S.DIODE	1SS375-TL	B
D25	1720000260	S.VARICAP	1SV214 (TPH2)	B
D26	1720000260	S.VARICAP	1SV214 (TPH2)	B
D27	1720000260	S.VARICAP	1SV214 (TPH2)	B
D28	1720000260	S.VARICAP	1SV214 (TPH2)	B
D31	1750000550	S.DIODE	1SS355 TE-17	T
D41	1750000130	S.DIODE	DA204U T106	B
D42	1790000700	DIODE	DSA3A1	T
D43	1750000550	S.DIODE	1SS355 TE-17	B
FI1	2030000350	MONOLITH	21R15AB (FL-368)	T
FI2	2030000270	MONOLITH	FL-363 (21.7 MHz)	T
FI3	2020001520	CERAMIC	CFWLA450KFFA-B0	T
FI4	2040001440	S.LC	NFE31PT152Z1E9L	T
FI5	2040001440	S.LC	NFE31PT152Z1E9L	T
X1	6050011760	S.XTAL	CR-768 (21.250 MHz)	T
X2	6070000190	S.DISCRIMINATOR	CDBCB450KCAY24-R0	T
L1	6200009560	S.COIL	MLG1608B R10J-T	T
L2	6200010840	S.COIL	MLG1608B 56NJ-T	T
L3	6200003090	S.COIL	NL 322522T-2R7J-3	T
L4	6200008190	S.COIL	0.25-1.9-8TL 80N	T
L6	6200009560	S.COIL	MLG1608B R10J-T	T
L7	6200010840	S.COIL	MLG1608B 56NJ-T	T
L11	6200009560	S.COIL	MLG1608B R10J-T	T
L12	6200009560	S.COIL	MLG1608B R10J-T	T
L14	6200005740	S.COIL	ELJRE 47NG-F	T

[MAIN-E UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
L15	6200002430	S.COIL	NL 252018T-082J	T
L16	6200009620	S.COIL	MLG1608B 68NJ-T	T
L17	6200002600	S.COIL	NL 252018T-047J	T
L18	6200002600	S.COIL	NL 252018T-047J	T
L19	6110001600	COIL	LA-243	T
L20	6170000230	COIL	LW-25	T
L21	6110001600	COIL	LA-243	T
L22	6110001600	COIL	LA-243	T
L31	6110001600	COIL	LA-243	T
L35	6150003820	COIL	LS-440	T
L36	6150003820	COIL	LS-440	T
L38	6150003820	COIL	LS-440	T
L39	6150003820	COIL	LS-440	T
L42	6200010090	S.COIL	ELJND R82JF	T
R1	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R2	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R3	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R4	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R5	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R6	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)	T
R7	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R8	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)	B
R9	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)	B
R10	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	B
R11	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)	T
R21	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	T
R22	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R23	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	B
R24	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)	B
R25	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	B
R26	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	T
R27	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	T
R28	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R31	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	T
R32	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)	T
R34	7030003300	S.RESISTOR	ERJ3GEYJ 680 V (68 Ω)	B
R36	7030003290	S.RESISTOR	ERJ3GEYJ 560 V (56 Ω)	T
R41	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)	T
R42	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)	T
R43	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)	T
R44	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	T
R45	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)	T
R46	7030003350	S.RESISTOR	ERJ3GEYJ 181 V (180 Ω)	T
R51	7030003420	S.RESISTOR	ERJ3GEYJ 681 V (680 Ω)	T
R52	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)	T
R55	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	T
R56	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)	T
R74	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)	B
R81	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R82	7030003270	S.RESISTOR	ERJ3GEYJ 390 V (39 Ω)	T
R83	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)	T
R84	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)	T
R85	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)	T
R86	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R87	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R88	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	T
R91	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)	T
R92	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	T
R93	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)	T
R94	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)	T
R95	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	T
R96	7030003270	S.RESISTOR	ERJ3GEYJ 390 V (39 Ω)	T
R97	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)	B
R103	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	B
R104	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	T
R107	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)	T
R110	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 kΩ)	T
R111	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R112	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)	T
R113	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R114	7310002670	S.TRIMMER	RV-143 (RH03A3AS2) 471	T
R115	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	B
R116	7030003310	S.RESISTOR	ERJ3GEYJ 820 V (82 Ω)	B
R121	7030005420	S.RESISTOR	ERJ3GEYJ 202 V (2 kΩ)	B
R122	7030005420	S.RESISTOR	ERJ3GEYJ 202 V (2 kΩ)	B
R123	7030001120	S.RESISTOR	MCR50JZHJ 82 Ω (820)	T
R124	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)	B
R125	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

S.=Surface mount

[MAIN-E UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
R126	7030005420	S.RESISTOR	ERJ3GEYJ 202 V (2 kΩ)	B
R127	7030005420	S.RESISTOR	ERJ3GEYJ 202 V (2 kΩ)	B
R141	7030003220	S.RESISTOR	ERJ3GEYJ 150 V (15 Ω)	T
R146	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R147	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	B
R149	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R150	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)	T
R151	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	T
R152	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)	T
R153	7030004050	S.RESISTOR	ERJ3GEYJ 1R0 V (1 Ω)	T
R154	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)	T
R155	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R161	7030003860	S.RESISTOR	ERJ3GE JPW V	T
R162	7030003860	S.RESISTOR	ERJ3GE JPW V	T
R163	7030003860	S.RESISTOR	ERJ3GE JPW V	T
R164	7030003860	S.RESISTOR	ERJ3GE JPW V	T
R165	7030003860	S.RESISTOR	ERJ3GE JPW V	T
R166	7030003860	S.RESISTOR	ERJ3GE JPW V	T
R167	7030003860	S.RESISTOR	ERJ3GE JPW V	B
R168	7030003860	S.RESISTOR	ERJ3GE JPW V	B
R171	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R172	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R173	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	B
R176	7030003820	S.RESISTOR	ERJ3GEYJ 155 V (1.5 MΩ)	T
R177	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	T
R178	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R181	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R182	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)	T
R183	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	T
R185	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)	B
R201	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)	B
R202	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	B
R203	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R204	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)	B
R205	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	T
R206	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)	B
R207	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)	T
R208	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)	T
R212	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)	B
R213	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	B
R214	7310002760	S.TRIMMER	RV-152 (RH03A3AJ4X0HA) 223	T
R215	7510001660	S.THRMISTOR	NTCG16 4LH 473KT	T
R216	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)	T
R218	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	T
R219	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	B
R221	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)	B
R222	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)	B
R223	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)	B
R224	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	B
R225	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)	B
R226	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)	B
R227	7510001550	S.THERMISTOR	NTCG16 4LH 333KT	B
R231	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	T
R232	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	T
R233	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	T
R234	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)	T
R235	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)	T
R236	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)	T
R237	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)	T
R241	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	T
R243	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	T
R246	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R252	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	T
R257	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)	T
R261	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R262	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R291	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)	T
R292	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	T
R293	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)	T
R294	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)	T
R301	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R302	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	B
R303	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)	B
R304	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)	B
R305	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R306	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R307	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 kΩ)	B
R308	7030003750	S.RESISTOR	ERJ3GEYJ 394 V (390 kΩ)	B
R309	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R311	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	B
R312	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)	B
R313	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)	B
R314	7030003770	S.RESISTOR	ERJ3GEYJ 564 V (560 kΩ)	B
R315	7030003860	S.RESISTOR	ERJ3GE JPW V	B
R316	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)	B
R317	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)	B
R318	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R323	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)	B

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

[MAIN-E UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
R324	7510001670	S.THRMISTOR	NTCG16 4BH 103KT	T
R325	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)	T
R326	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	T
R327	7310002600	S.TRIMMER	RV-110 (RH03A3AS4X0AA) 473	T
R328	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)	T
R341	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	B
R351	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	B
R352	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)	B
R353	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	T
R354	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	T
R355	7030009920	S.RESISTOR	ERJ3GEYJ 335 V (3.3 MΩ)	T
R356	7030000100	S.RESISTOR	MCR10EZHJ 4.7 Ω (4R7)	B
R381	7030001040	S.RESISTOR	MCR50JZHJ 18 Ω (180)	T
R382	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R383	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)	T
R384	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R385	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)	T
R386	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)	B
R387	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	B
R401	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	T
R411	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)	B
R412	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	B
R413	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	B
R414	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)	B
R415	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)	B
R416	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)	B
R417	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	B
C1	4030008880	S.CERAMIC	C1608 JB 1H 223K-T	T
C2	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C3	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C4	4550000510	S.TANTALUM	TEESVA 1V 473M8L	B
C5	4550006560	S.TANTALUM	ECST1CY225R	B
C7	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C11	4030007020	S.CERAMIC	C1608 CH 1H 120J-T	T
C12	4610001590	S.TRIMMER	TZC3R100A110R00	T
C13	4030007040	S.CERAMIC	C1608 CH 1H 180J-T	T
C21	4510004630	S.ELECTROLYTIC	ECEV1CA100SR	T
C22	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	B
C23	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C24	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	B
C25	4550006700	S.TANTALUM	ECST1AY106R	B
C26	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C27	4030017490	S.CERAMIC	C1608 JB 1A 105K-T	T
C28	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C29	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	B
C31	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	T
C32	4030009920	S.CERAMIC	C1608 CH 1H 050B-T	T
C33	4030007050	S.CERAMIC	C1608 CH 1H 220J-T	T
C34	4030007060	S.CERAMIC	C1608 CH 1H 270J-T	T
C35	4030007060	S.CERAMIC	C1608 CH 1H 270J-T	T
C36	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C41	4030007080	S.CERAMIC	C1608 CH 1H 390J-T	T
C42	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	T
C43	4550006130	S.TANTALUM	ECST1VY224R	T
C44	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C45	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T	T
C46	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T	T
C47	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C48	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	T
C49	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	T
C51	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T	T
C52	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	T
C55	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C56	4030007020	S.CERAMIC	C1608 CH 1H 120J-T	T
C57	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	T
C58	4030007070	S.CERAMIC	C1608 CH 1H 330J-T	T
C74	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	B
C75	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C77	4030009910	S.CERAMIC	C1608 CH 1H 040B-T	T
C81	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C82	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C83	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	T
C84	4030007040	S.CERAMIC	C1608 CH 1H 180J-T	T
C85	4030007040	S.CERAMIC	C1608 CH 1H 180J-T	T
C86	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C87	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	T
C88	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C91	4030007040	S.CERAMIC	C1608 CH 1H 180J-T	T
C93	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C94	4030009530	S.CERAMIC	C1608 CH 1H 030B-T	T
C95	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C96	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	T
C97	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	T
C98	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C99	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	B
C100	4030007010	S.CERAMIC	C1608 CH 1H 100D-T	B

S.=Surface mount

[MAIN-E UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
C101	4030007050	S.CERAMIC	C1608 CH 1H 220J-T	T
C102	4030007040	S.CERAMIC	C1608 CH 1H 180J-T	T
C103	4030007080	S.CERAMIC	C1608 CH 1H 390J-T	T
C104	4030007040	S.CERAMIC	C1608 CH 1H 180J-T	B
C105	4510005310	S.ELECTROLYTIC	ECEV1CA220SR	T
C106	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C107	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C108	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	B
C109	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C110	4510005310	S.ELECTROLYTIC	ECEV1CA220SR	T
C112	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	B
C113	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C115	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C116	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	T
C117	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	T
C118	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C119	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C120	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C121	4030011170	S.CERAMIC	GRM31M2C2H180JV01L	B
C122	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C123	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C124	4030011170	S.CERAMIC	GRM31M2C2H180JV01L	B
C125	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C126	4030017200	S.CERAMIC	GRM31BR32J102KY01L	T
C127	4030011170	S.CERAMIC	GRM31M2C2H180JV01L	B
C130	4030011190	S.CERAMIC	GRM31M2C2H270JV01L	B
C133	4030011070	S.CERAMIC	GRM31M2C2H5R0CY21L	B
C134	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C135	4030007050	S.CERAMIC	C1608 CH 1H 220J-T	T
C137	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C138	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	B
C139	4030007050	S.CERAMIC	C1608 CH 1H 220J-T	B
C140	4030007170	S.CERAMIC	C1608 CH 1H 221J-T	B
C141	4030011190	S.CERAMIC	GRM31M2C2H270JV01L	B
C142	4030011180	S.CERAMIC	GRM31M2C2H220JV01L	B
C144	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C145	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C146	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C149	4030006990	S.CERAMIC	C1608 CH 1H 080D-T	B
C150	4030007010	S.CERAMIC	C1608 CH 1H 100D-T	B
C152	4030007010	S.CERAMIC	C1608 CH 1H 100D-T	B
C153	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C154	4030009350	S.CERAMIC	C1608 CH 1H 3R5B-T	T
C156	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C157	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C158	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C159	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C160	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C161	4030009530	S.CERAMIC	C1608 CH 1H 030B-T	B
C162	4030007010	S.CERAMIC	C1608 CH 1H 100D-T	B
C163	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C164	4030009530	S.CERAMIC	C1608 CH 1H 030B-T	B
C173	4030007010	S.CERAMIC	C1608 CH 1H 100D-T	B
C174	4030009520	S.CERAMIC	C1608 CH 1H 020B-T	B
C175	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T	B
C176	4030009560	S.CERAMIC	C1608 CH 1H R75B-T	B
C177	4030009530	S.CERAMIC	C1608 CH 1H 030B-T	B
C178	4030007010	S.CERAMIC	C1608 CH 1H 100D-T	B
C179	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C182	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C183	4030011770	S.CERAMIC	C1608 CH 1H 060B-T	T
C184	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C185	4030009550	S.CERAMIC	C1608 CH 1H 2R5B-T	T
C186	4030007100	S.CERAMIC	C1608 CH 1H 560J-T	T
C187	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C188	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C189	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C193	4030011770	S.CERAMIC	C1608 CH 1H 060B-T	B
C195	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C202	4030008880	S.CERAMIC	C1608 JB 1H 223K-T	B
C203	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C204	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	B
C205	4030007130	S.CERAMIC	C1608 CH 1H 101J-T	T
C208	4510004630	S.ELECTROLYTIC	ECEV1CA100SR	T
C209	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C210	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C211	4030011280	S.CERAMIC	C1608 CH 1H 271J-T	B
C212	4030011280	S.CERAMIC	C1608 CH 1H 271J-T	B
C213	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C215	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C216	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C217	4030007050	S.CERAMIC	C1608 CH 1H 220J-T	B
C218	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C219	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C220	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C221	4030011810	S.CERAMIC	C1608 JB 1A 224K-T	T
C222	4030011810	S.CERAMIC	C1608 JB 1A 224K-T	B
C223	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

[MAIN-E UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
C231	4030011810	S.CERAMIC	C1608 JB 1A 224K-T	T
C232	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C233	4030008880	S.CERAMIC	C1608 JB 1H 223K-T	T
C234	4030008880	S.CERAMIC	C1608 JB 1H 223K-T	T
C235	4510004630	S.ELECTROLYTIC	ECEV1CA100SR	T
C236	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C237	4510005860	S.ELECTROLYTIC	ECEV1HA2R2SR	T
C241	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C252	4030017490	S.CERAMIC	C1608 JB 1A 105K-T	T
C291	4510004630	S.ELECTROLYTIC	ECEV1CA100SR	T
C292	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C293	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C301	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C302	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	B
C303	4030007170	S.CERAMIC	C1608 CH 1H 221J-T	B
C304	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	B
C305	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C306	4030007100	S.CERAMIC	C1608 CH 1H 560J-T	B
C311	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C312	4030009490	S.CERAMIC	C1608 JB 1H 821K-T	B
C313	4030006880	S.CERAMIC	C1608 JB 1H 472K-T	B
C314	4030007100	S.CERAMIC	C1608 CH 1H 560J-T	B
C315	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	B
C316	4510004630	S.ELECTROLYTIC	ECEV1CA100SR	T
C323	4030008470	S.CERAMIC	C1608 JB 1H 272K-T	T
C331	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C332	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C333	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C334	4030007050	S.CERAMIC	C1608 CH 1H 220J-T	T
C335	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C336	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C337	4030007050	S.CERAMIC	C1608 CH 1H 220J-T	T
C338	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C339	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C340	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C341	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C342	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C343	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C344	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	B
C345	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	B
C346	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C347	4030007120	S.CERAMIC	C1608 CH 1H 820J-T	T
C348	4030007120	S.CERAMIC	C1608 CH 1H 820J-T	T
C349	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C351	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C352	4510005860	S.ELECTROLYTIC	ECEV1HA2R2SR	T
C353	4030017490	S.CERAMIC	C1608 JB 1A 105K-T	T
C354	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C355	4510004590	ELECTROLYTIC	16 MV 470 HC	T
C356	4510007480	ELECTROLYTIC	16 MV 470 CA	T
C357	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C358	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C359	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C361	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C362	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	T
C363	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C364	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	T
C367	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C368	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C369	4510007480	ELECTROLYTIC	16 MV 470 CA	T
C370	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C371	4030007010	S.CERAMIC	C1608 CH 1H 100D-T	B
C372	4030007170	S.CERAMIC	C1608 CH 1H 221J-T	B
C373	4030007010	S.CERAMIC	C1608 CH 1H 100D-T	B
C374	4030007170	S.CERAMIC	C1608 CH 1H 221J-T	B
C375	4030007010	S.CERAMIC	C1608 CH 1H 100D-T	B
C376	4030007170	S.CERAMIC	C1608 CH 1H 221J-T	B
C377	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C378	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C381	4510004630	S.ELECTROLYTIC	ECEV1CA100SR	T
C382	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	B
C383	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C384	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C385	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C386	4510006220	S.ELECTROLYTIC	ECEV1CA101UP	T
C387	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C388	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C389	4510004630	S.ELECTROLYTIC	ECEV1CA100SR	T
C390	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C391	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C392	4510004630	S.ELECTROLYTIC	ECEV1CA100SR	T
C401	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C402	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	T
C403	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C411	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C412	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	T
C413	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C414	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B

S.=Surface mount

[MAIN-E UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
C415	4030008470	S.CERAMIC	C1608 JB 1H 272K-T	B
C416	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
RL1	6330001670	RELAY	FTR-P3CP012W1	T
J4	6510018970	S.CONNECTOR	B4B-PH-SM3-TB	T
J5	6510019420	S.CONNECTOR	B8B-ZR-SM3-TF	T
J6	6510022470	S.CONNECTOR	40FLT-SM1-TB	T
J7	6510015540	S.CONNECTOR	B4B-ZR-SM3-TF	T
T1	5920000570	TRANSFORMER	12T01	T
W1	7120000470	JUMPER	ERDS2T0	T
W2	7120000470	JUMPER	ERDS2T0	T
EP1	0910056801	PCB	B 6053A	

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

[LOGIC-E BOARD]

REF NO.	ORDER NO.	DESCRIPTION		M.
IC1	1140011930	S.IC	HD6433847RB82H (FX-2706B)	T
IC2	1110005770	S.IC	S-80942CNMC-G9C-T2	T
IC3	1130007570	S.IC	BU4094BCFV-E2	T
IC4	1130009680	S.IC	HN58X2432TI	T
IC7	1130005290	S.IC	TC74HC14AF	T
IC8	1170000350	S.IC	PC357N6T	T
IC9	1110002700	S.IC	NJM2904M-TE1	T
Q1	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	T
Q2	1520000460	S.TRANSISTOR	2SB1132 T100 R	T
Q3	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	T
Q4	1560000810	S.FET	2SK1069-4-TL	T
Q6	1590000680	S.TRANSISTOR	DTC114EUA T106	T
Q7	1590000720	S.TRANSISTOR	DTA144EUA T106	T
Q8	1530002060	S.TRANSISTOR	2SC4081 T106 R	T
Q9	1510000510	S.TRANSISTOR	2SA1576A T106R	T
Q11	1590001330	S.TRANSISTOR	DTA114EUA T106	T
D1	1750000550	S.DIODE	1SS355 TE-17	T
D2	1750000550	S.DIODE	1SS355 TE-17	T
D3	1730002360	S.ZENER	MA8062-M (TX)	T
D4	1730002360	S.ZENER	MA8062-M (TX)	T
D5	1730002360	S.ZENER	MA8062-M (TX)	T
D6	1730002360	S.ZENER	MA8062-M (TX)	T
D7	1750000150	S.DIODE	DA204K T146	T
X1	6050011500	S.XTAL	CR-739 (9.8304 MHz)	T
R1	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R2	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)	T
R3	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R4	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	T
R5	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R6	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)	T
R7	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)	T
R8	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R9	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R10	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R11	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)	T
R12	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R13	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R14	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)	T
R15	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R16	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)	T
R17	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)	T
R18	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	T
R19	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	T
R20	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)	T
R21	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)	T
R22	7030003250	S.RESISTOR	ERJ3GEYJ 270 V (27 Ω)	T
R23	7030003250	S.RESISTOR	ERJ3GEYJ 270 V (27 Ω)	T
R24	7030003250	S.RESISTOR	ERJ3GEYJ 270 V (27 Ω)	T
R25	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)	T
R26	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)	T
R27	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)	T
R28	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R29	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R30	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R31	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R32	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R33	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R34	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R35	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R36	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)	T
R37	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	T
R38	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)	T
R41	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)	T
R42	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)	T
R43	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R44	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)	T
R45	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R46	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)	T
R47	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R48	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)	T
R49	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R50	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)	T
R51	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R52	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)	T
R53	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R54	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)	T
R55	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R56	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)	T
R60	7030006041	S.RESISTOR	ERA3YED 622V	T
R61	7030003860	S.RESISTOR	ERJ3GE JPW V	T

S.=Surface mount

[LOGIC-E BOARD]

REF NO.	ORDER NO.	DESCRIPTION		M.
R62	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R63	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)	T
R64	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	T
R65	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R71	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	T
R72	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	T
R73	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)	T
R75	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R77	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	T
R78	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)	T
R81	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	T
R82	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R83	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R84	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)	T
R85	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	T
R86	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R87	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R88	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R90	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	T
C1	4030007060	S.CERAMIC	C1608 CH 1H 270J-T	T
C2	4030009650	S.CERAMIC	C1608 CH 1H 240J-T	T
C3	4030008890	S.CERAMIC	C1608 JB 1H 273K-T	T
C5	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C6	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C7	4550006210	S.TANTALUM	ECST1CX106R	T
C8	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C9	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C11	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C12	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C41	4550006210	S.TANTALUM	ECST1CX106R	T
C42	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C43	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C44	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C72	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C73	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C74	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C75	4030006880	S.CERAMIC	C1608 JB 1H 472K-T	T
C76	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C81	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C82	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	T
C91	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C92	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C93	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C94	4030006850	S.CERAMIC	C1608 JB 1H 471K-T	T
C95	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C96	4030006850	S.CERAMIC	C1608 JB 1H 471K-T	T
J1	6510021440	S.CONNECTOR	B6B-ZR-SM3-TF	T
J3	6510022190	S.CONNECTOR	B3B-PH-SM3-TB	T
J4	6510022470	S.CONNECTOR	40FLT-SM1-TB	T
DS1	5030001950	LCD	TTR5341	B
DS2	5040002310	S.LED	SML-311YTT86	B
DS3	5040002310	S.LED	SML-311YTT86	B
DS4	5040002310	S.LED	SML-311YTT86	B
DS5	5040002310	S.LED	SML-311YTT86	B
DS6	5040002660	S.LED	FY1101F-TR (LED)	B
DS7	5040002660	S.LED	FY1101F-TR (LED)	B
EP1	0910056810	PCB	B 6054	
EP2	8930054970	LCD CONTACT	SRCN-2438-SP-N-W	B

[VR BOARD]

REF NO.	ORDER NO.	DESCRIPTION		M.
R1	7210002350	VARIABLE	TP96N97N15F-10KA-1301	T
W1	8900010820	CABLE	OPC-1099 <CMI>	T
EP1	0910056781	PCB	B 6051A	

[SQL BOARD]

REF NO.	ORDER NO.	DESCRIPTION		M.
R1	7210002360	VARIABLE	TP96N97-15F-10KB-1301	
EP1	0910056791	PCB	B 6052A	

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
MC1	0800006232	MICROPHONE	HM-132B-2 ACC <KN> [BLACK]	
MC1	0800006242	MICROPHONE	HM-132W-2 ACC <KN> [WHITE	
SP1	2510001240	SPEAKER	045P0803 <FG>	
W1	7120000470	JUMPER	ERDS2T0	
W2	7120000470	JUMPER	ERDS2T0	
W3	8900010500	CABLE	OPC-1046	

[CHASSIS UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
C1	4020000430	CYLINDER	UP050 B 471K-NA-CZ	
J1	6510004880	CONNECTOR	MR-DS-E 01	
W1	8900010710	CABLE	OPC-1087 <LIA>	
W2	8900010491	CABLE	OPC-1041A	
W3	7120000470	JUMPER	ERDS2T0	

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

S.=Surface mount

6-2 HM-132

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
R1	7010007640	RESISTOR	FRD25 T2-123J (12 kΩ)	T
R2	7010007630	RESISTOR	FRD25 T2-682J (6.8 kΩ)	T
R3	7010007650	RESISTOR	FRD25 T2-153J (15 kΩ)	T
R4	7010007660	RESISTOR	FRD25 T2-333J (33 kΩ)	T
C1	4030018550	S.CERAMIC	C1608 JB 1H 223K-T	T
C2	4030011340	S.CERAMIC	C1608 CH 1H 471J-T	B
MC1	7700002500	MICROPHONE	KUC3523-040245	
S1	2260002330	SWITCH	SKHHLP014A	B
S2	2260002340	SWITCH	SKHHAM024A	T
S3	2260002340	SWITCH	SKHHAM024A	T
S4	2260002340	SWITCH	SKHHAM024A	T
W1	9018490010	WIRE	71/98/010/X98/X98 <KN>	T
W2	9018490010	WIRE	71/98/010/X98/X98 <KN>	T
W3	9024495010	WIRE	24/00/020/W01/W01 <KN>	B
W4	9024495020	WIRE	24/04/020/W01/W01 <KN>	B
EP1	0910053701	PCB	B-5587A	

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 IC-M401E

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J 1	6510004880	Connector MR-DS-E 01	1
W 1	8900010710	Cable OPC-1087 (nut, w/gasket) <LIA>	1
W 2	8900010491	Cable OPC-1041A	1
MP1	8510013960	2438 case Ass'y <KN> [black]	1
	8510013970	2438 case (A) Ass'y <KN> [white]	1
MP4	8930055070	2438 sheet	1
MP5	8930054660	2438 R-packing	1
MP11	8010018473	2438 chassis-3	1
MP12	8930034300	1542 antennna seal	1
MP13	8810002950	Screw bind M3 × 6 SUS	2
MP14	8930054620	2438 B-bush plate<KN>	1
MP16	8510016000	2706 module plate Y701	1
MP17	8510011870	2040 module cover Y413	1
MP19	8810008660	Screw PH BT M3 × 8 NI-ZU	2
MP20	8950000180	Cable tie 80	2
MP22	8930052440	2345 B-IC CLIP	1
MP23	8810008660	Screw PH BT M3 × 8 NI-ZU	6
MP24	8950000180	Cable tie-80	1
MP25	8930055850	2490 grounding plate	1
MP26	8810008630	Screw PH BT M3 × 6 NI-ZU	1
MP27	6910008240	Clip 59TN4772	1
MP31	8510014070	2490 B-shield cover	1
MP32	8930056401	Shiled sponge (H)-1	1
MP33	8510014080	2490 A-shield cover	1
MP40	8810008680	Screw PH M3 × 8 NI	4
MP41	8930045280	Seal 2040 F-packing	1
MP42	8820001210	2438 screw	6
MP43	8930052290	Swal O-ring (AD)	6
MP45	8930055040	2438 cap <KN>	1
MP47	8930049040	Isolating sheet FQ	1
MP48	8930061410	2685 grounding spring Y699	1

[FRONT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MC1	800006232	Microphone HM-132B-2 <KN> [black]	1
	800006242	Microphone HM-132W-2 <KN> [white]	1
SP 1	2510001240	Speaker 045P0803 <FG>	1
W 3	8900010500	Cable OPC-1046	1
MP1	8210020680	2438 front panel (K) ASS'Y <KN> [black]	1
	8210020690	2438 front panel (L) ASS'Y <KN> [white]	1
MP2	8310050810	2438 window plate <KN>	1
MP4	8930014280	Speaker net FX706	1
MP5	8110007580	2490 E-cover <KN>	1
MP10	8930055601	2438 key bord (A)-1 <KN>	1
MP21	8930052280	O-ring (AC)	2
MP22	8310051220	2438 C-bush plate <KN>	1
MP23	8930055840	2490 grounding spring	1
MP25	8810008660	Screw PH BT M3 × 8 NI-ZU	4
MP31	8610011060	TSUMAMI N286 Ass'y <KN> [black]	2
	8610011070	TSUMAMI N286(A) Ass'y <KN> [white]	2
MP33	8610009240	Knob spring NO.7800P	2

[LOGIC-E BOARD]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
DS 1	5030001950	LCD TTR5341	1
EP 2	8930054970	LCD contact SRCN-2438-SP-N-W	2
MP1	8210017700	2438 reflector	1
MP2	8930054650	2438 LCD holder <KN>	1
MP3	8930055060	2438 white sheet	1

[VR BOARD]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
R 1	7210002350	TP96N97N15F-10KA-1301 (incl. nut)	1
W 1	8900010820	Cable OPC-1099 <CM1>	1

[SQL BOARD]

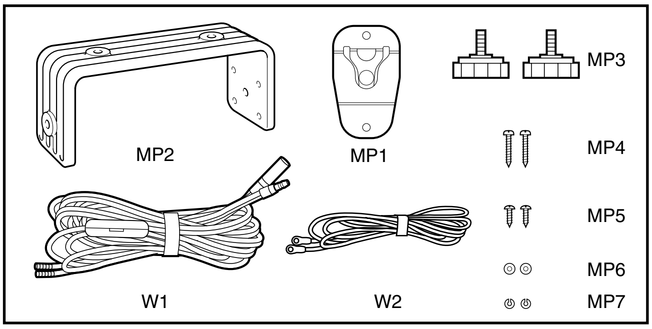
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
R1	7210002360	TP96N97N15F-10KB-1301 (incl. nut)	1

[MAIN-E UNIT]

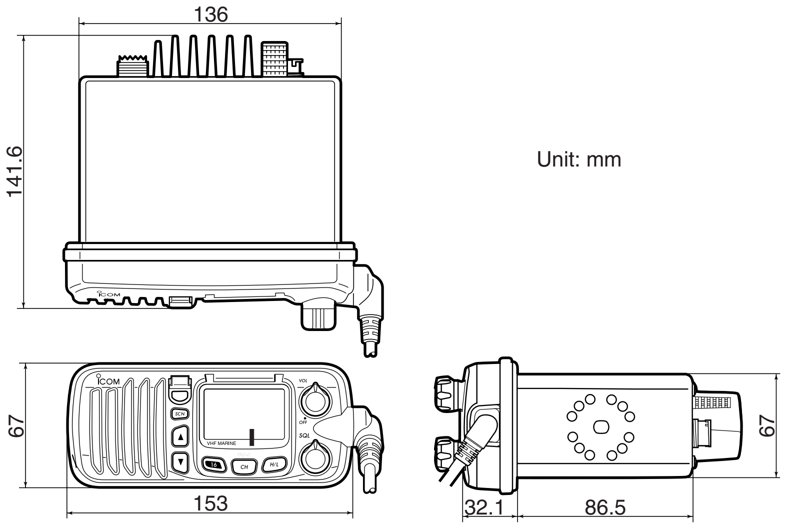
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	6910015690	2685 shield case	1
MP2	8510002280	VCO shield plate (A) FX 15	1
MP3	8930052271	Shield sponge (D)-1	1
MP4	8930005320	filter spacer	2
MP5	8510014180	2490 shield plate Y596	1

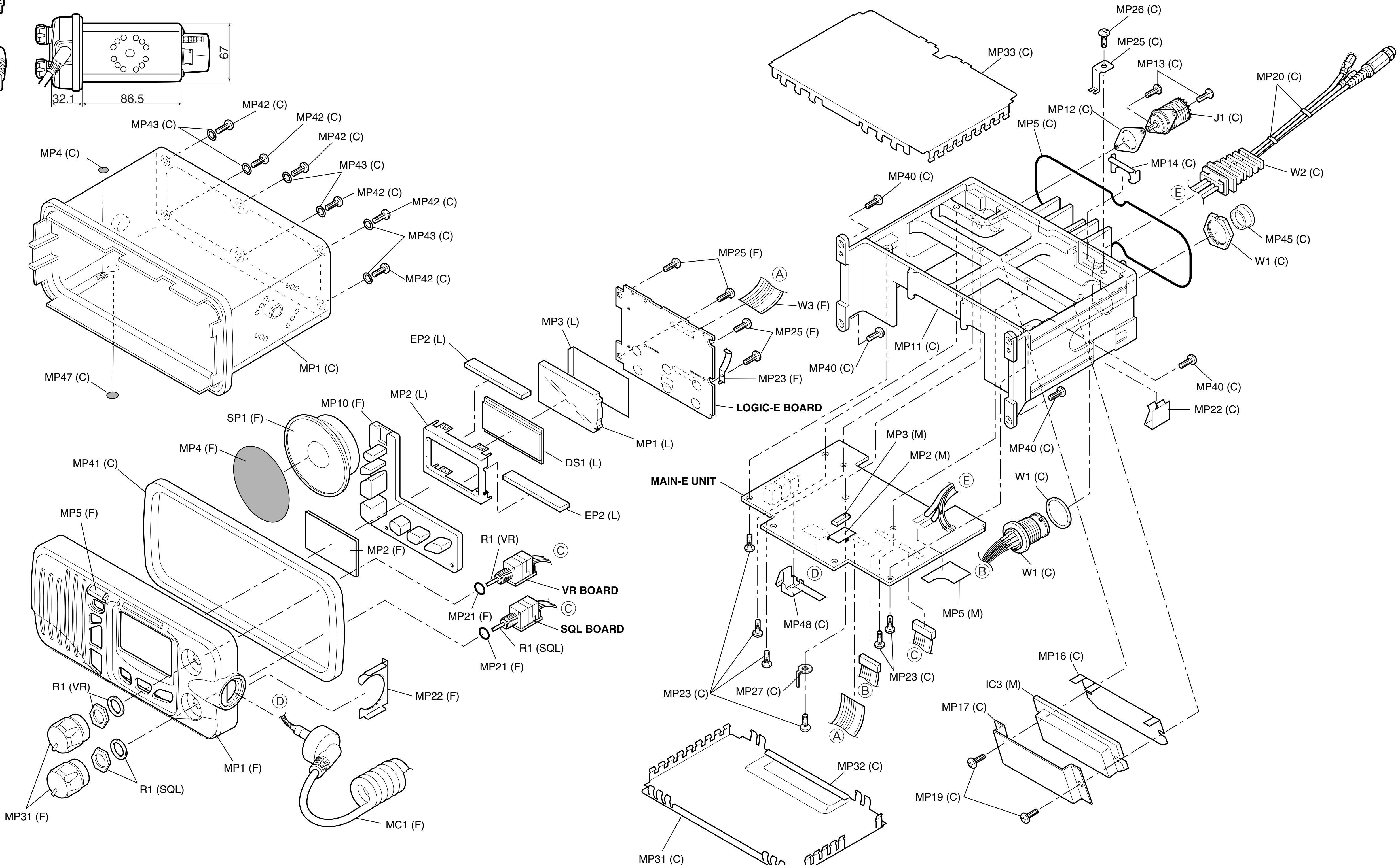
[ACCESSORIES]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
W 1	8900009040	Cable OPC-891 [black]	1
W 2	8900010770	Cable OPC-1097 [white]	1
MP1	8950005110	2289 MIC hanger	1
MP2	8010017250	2040 Mobile bracket [black]	1
	8010017270	2040 Mobile bracket (A) [white]	1
MP3	8610010561	2040 Knob bolt-1 [black]	2
	8610010591	2040 Knob bolt (A)-1 [white]	2
MP4	8810004700	Screw PH A0 M3 × 16 SUS	2
MP5	8810001490	Screw PH A0 M5 × 20 SUS	2
MP6	8850000180	Flat washer M5 SUS	2
MP7	8850000500	Spring washer M5 SUS	2



Screw abbreviations A0, B0, BT: Self-tapping
PH: Pan head
BiH: Bind head
NI: Nickel
SUS: Stainless
NI-ZU: Nickel-Zinc



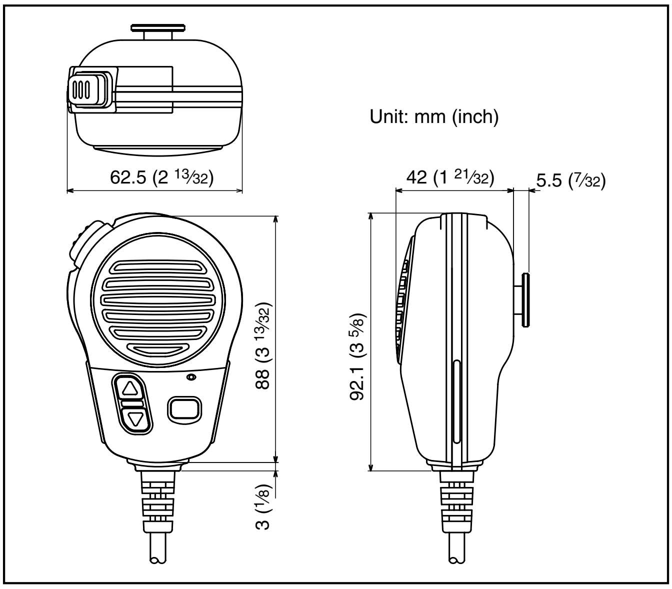


UNIT abbreviations (C): CHASSIS PARTS, (L): LOGIC-E BOARD, (M): MAIN-E UNIT
(VR): VR BOARD, (SQL): SQL BOARD, (F): FRONT UNIT

7-2 HM-132

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION		QTY.
W1	8900010610	Cable OPC-1081	[black]	1
	8900010620	Cable OPC-1082	[white]	1
MP1	8210017950	2352 front panel (D)-1	[black]	1
	8210017960	2352 front panel (E)-1	[white]	1
MP2	8210016850	2352 rear panel	[black]	1
	8210017110	2352 rear panel (A)	[white]	1
MP3	8930052160	2352 key		1
MP4	8930052150	2352 PTT rubber		1
MP5	8930052140	2352 PTT holder		1
MP6	8930052690	2352 MIC rubber		1
MP7	8930052120	2352 rubber		1
MP8	8930052110	2352 main seal		1
MP9	8610010870	2352 hanger knob		1
MP10	8310048760	2352 R-plate		1
MP11	8310048780	2352 MIC plate		1
MP12	8820001150	2352 screw		5
MP13	8850001850	ICOM washer (Y)		5
MP14	8930052340	O-ring (AE)		5
MP15	8930052350	O-ring (AF)		1
MP16	8930056460	2449 MIC sheet		1
MP17	8930054910	2449 SP Rubber		1
MP18	8850001610	Spring washer M4 SUS		1
MP19	8810009260	Screw PH B0 2 × 6 NI (BT)		3
MP21	8810009240	Screw BiH M4 × 10 ZK		1
MP23	8810008900	Screw PH M3 × 6 NI		1

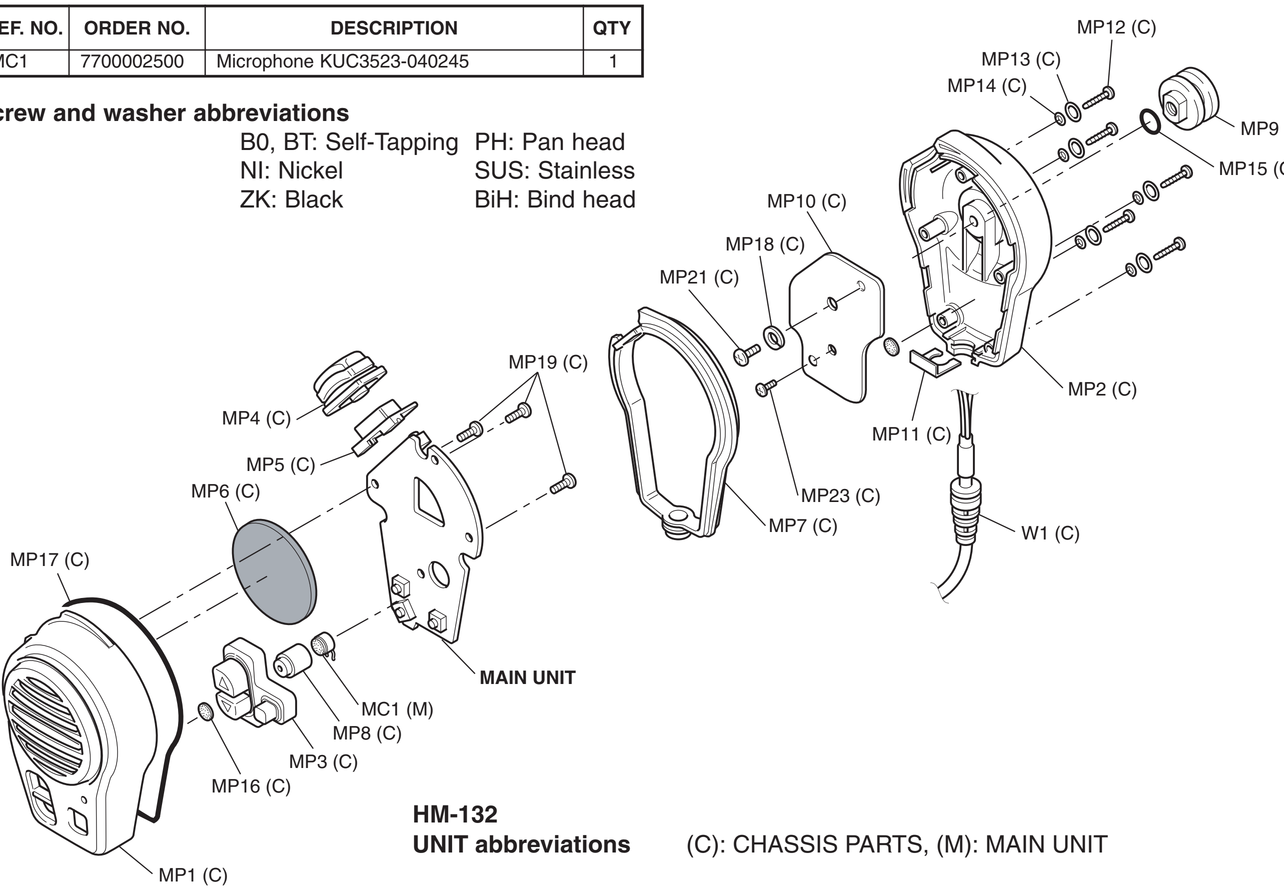


[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY
MC1	7700002500	Microphone KUC3523-040245	1

Screw and washer abbreviations

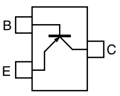
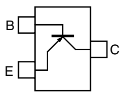
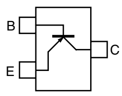
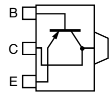
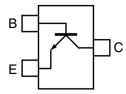
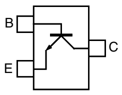
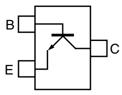
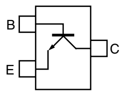
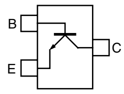
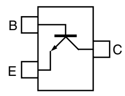
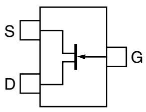
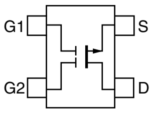
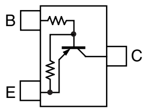
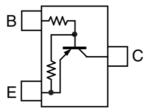
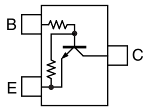
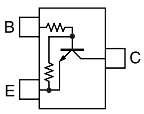
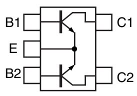
B0, BT: Self-Tapping PH: Pan head
NI: Nickel SUS: Stainless
ZK: Black BiH: Bind head



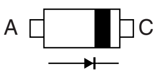
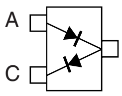
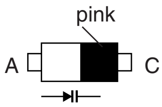
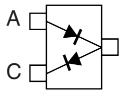
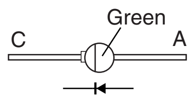
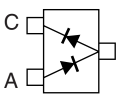
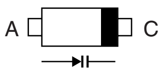
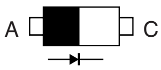
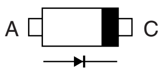
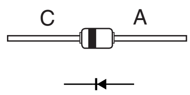
HM-132
UNIT abbreviations (C): CHASSIS PARTS, (M): MAIN UNIT

SECTION 8 SEMI-CONDUCTOR INFORMATION

• TRANSISTOR AND FET'S

2SA1576A R (Symbol: FR)  	**2SA1577 Q** (Symbol: HQ)  	**2SA1588 GR** (Symbol: ZG)  	**2SB1132 R** (Symbol: BAR)  	**2SC2714 Y** (Symbol: QY) 
2SC3775 3 (Symbol: OY3)  	**2SC4081 R** (Symbol: BR)  	**2SC4116 BL** (Symbol: LL)  	**2SC4215 O** (Symbol: QO)  	**2SC4226 R25** (Symbol: R25) 
2SK1069-4 (Symbol: FJ)  	**3SK131-T2-LA** (Symbol: V12)  	**DTA114 EUA** (Symbol: 14)  	**DTA144 EUA** (Symbol: 16)  	**DTC114 EUA** (Symbol: 24) 
DTC144 EUA (Symbol: 26)  	**FMW1** (Symbol: W1)  			

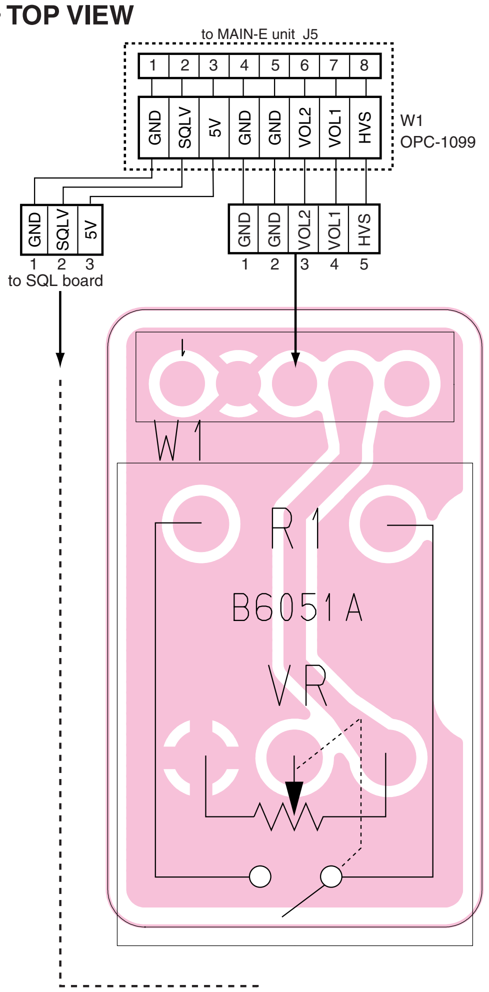
• DIODES

1SS355 (Symbol: A)  	**1SS375** (Symbol: FH)  	**1SV214** (Symbol: T1)  	**DA204 U** (Symbol: K) **DA204 K** (Symbol: K)  	**DSA3A1** (Symbol: Green) 
HSM88ASR (Symbol: C3)  	**HVC350BTRF** (Symbol: B0)  	**MA77** (Symbol: 4B)  	**MA8062-M** (Symbol: 6-2)  	**XB15A308** (Symbol: T8) 

SECTION 9 BOARD LAYOUTS

9-1 VR BOARD

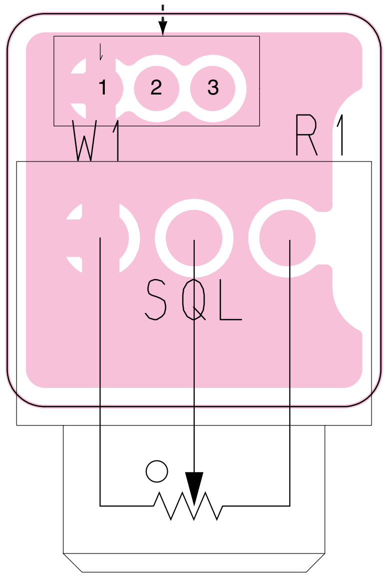
• TOP VIEW



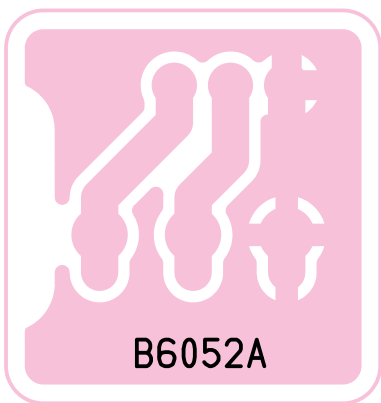
• BOTTOM VIEW

9-2 SQL BOARD

• TOP VIEW

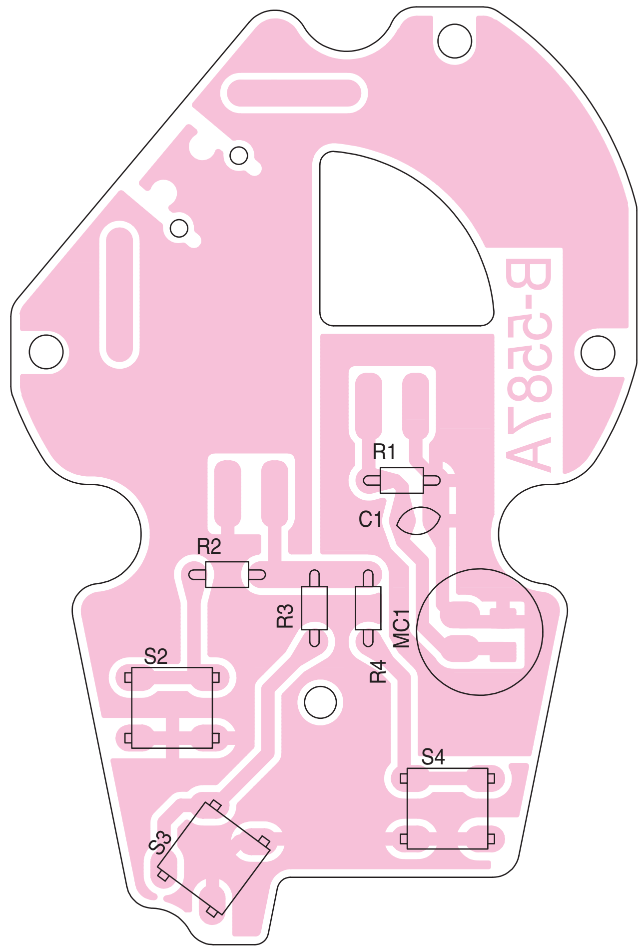


• BOTTOM VIEW

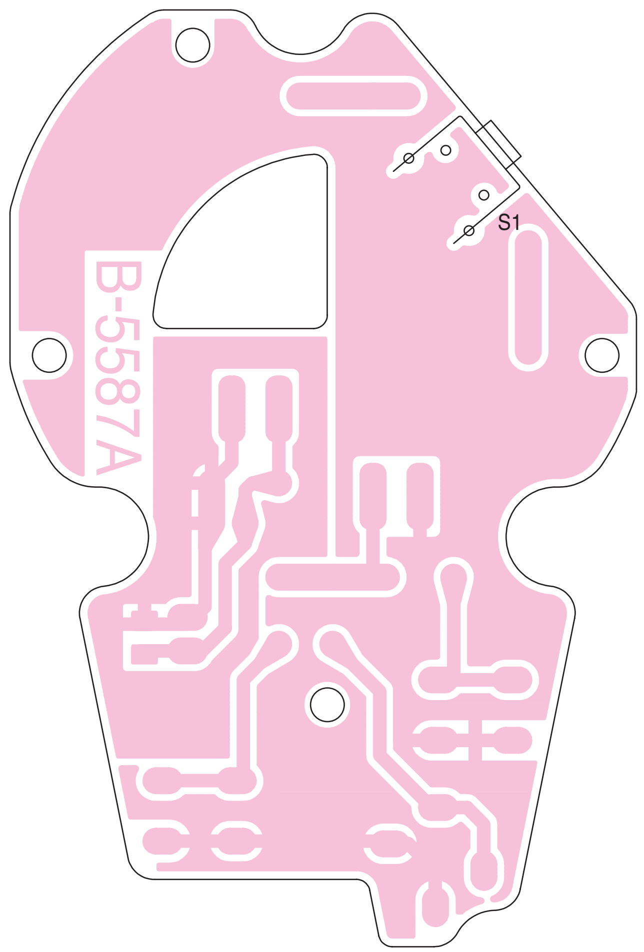


9-3 HM-132

• TOP VIEW



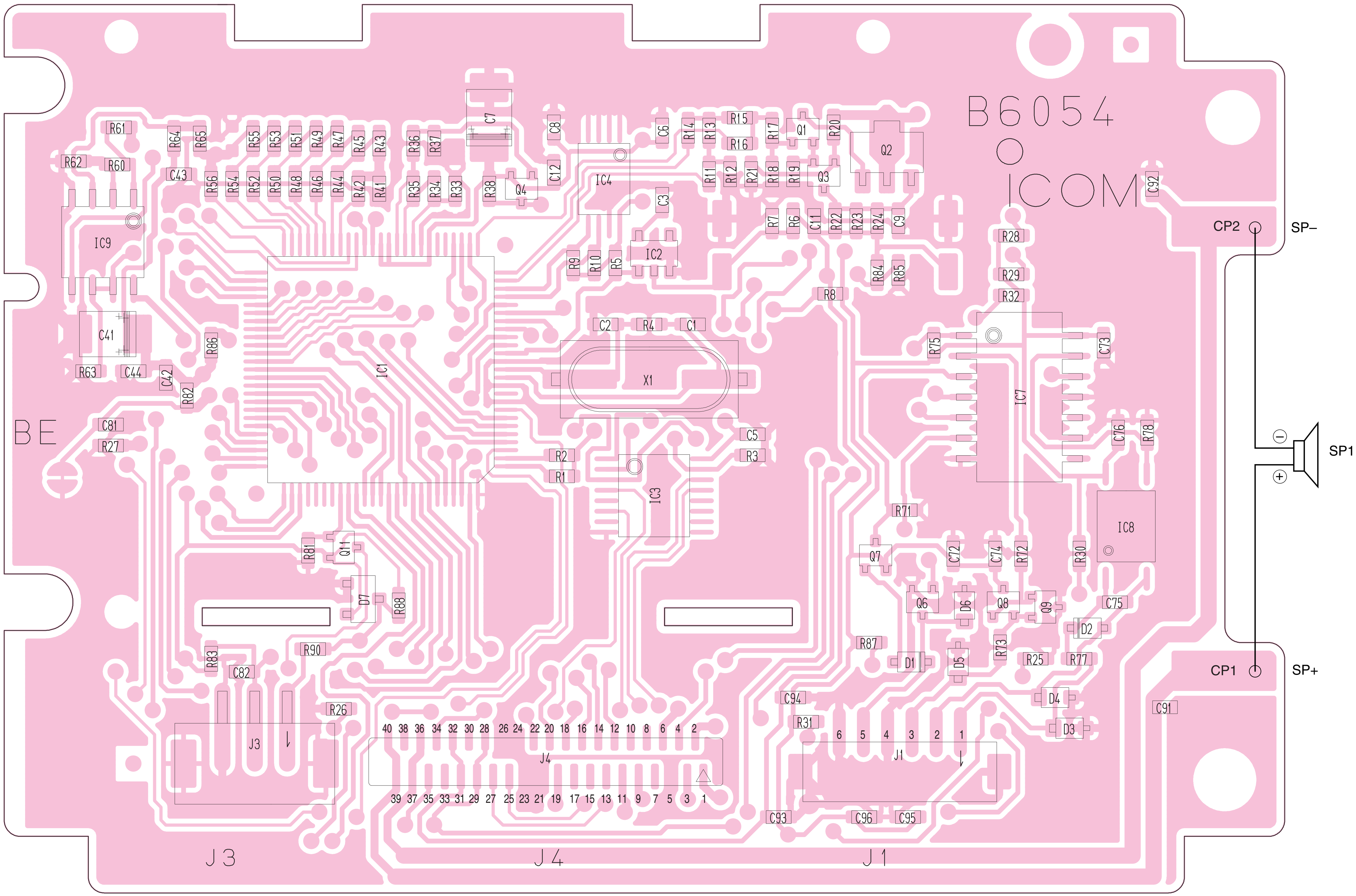
• BOTTOM VIEW



The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

9-4 LOGIC-E BOARD

• **TOP VIEW**



J3 — to Smart MIC (HM-132)

Pin	3	2	1
Signal	GND	KEYM	HANG

J4 — to MAIN-E unit J6 (W3: OPC-1046)

Pin	40	38	36	34	32	30	28	26	24	22	20	18	16	14	12	10	8	6	4	2
Signal	SP+	NC	SP−	BPLVL	VCC	NC	5V	GND	GND	TMUT	TXDET	H/LO	SQLV	PTT	BPFV	NC	NC	SQL	UNLK	PSTB

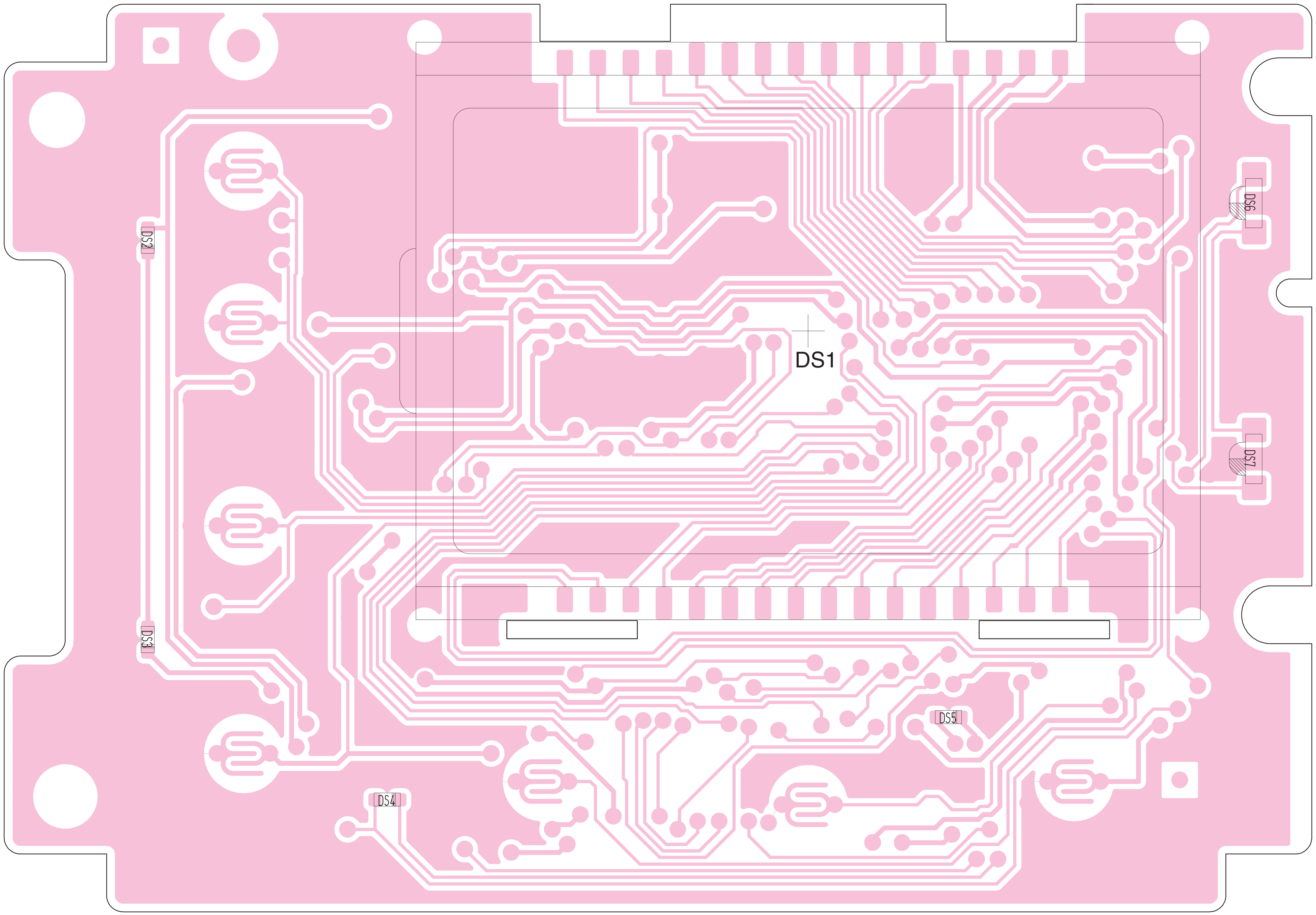
Pin	39	37	35	33	31	29	27	25	23	21	19	17	15	13	11	9	7	5	3	1
Signal	SP+	SP−	BEEPM	NC	VCC	5V	RCV	SEND	GND	GND	ATIS	NC	NC	NC	PTTM	RMUTM	NC	GND	PDATA	PCK

J1 — to DS-100 (OPC-1087)

Pin	6					1
Signal	GND	ICF3	DATAS−	DATAS+	DATAM−	DATAM+

• **BOTTOM VIEW**

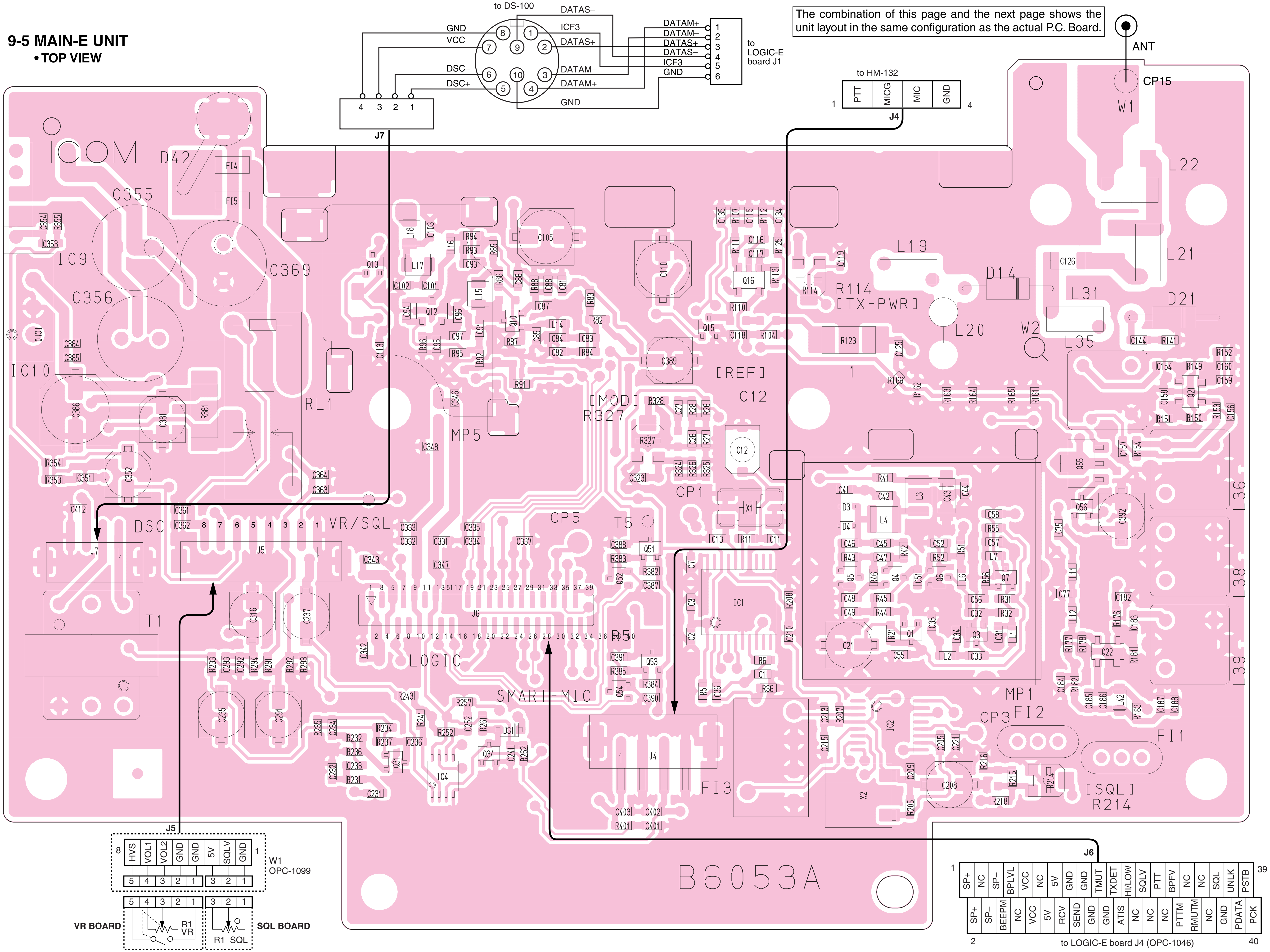
The combination of this page and the previous page shows the unit layout in the same configuration as the actual P.C. Board.



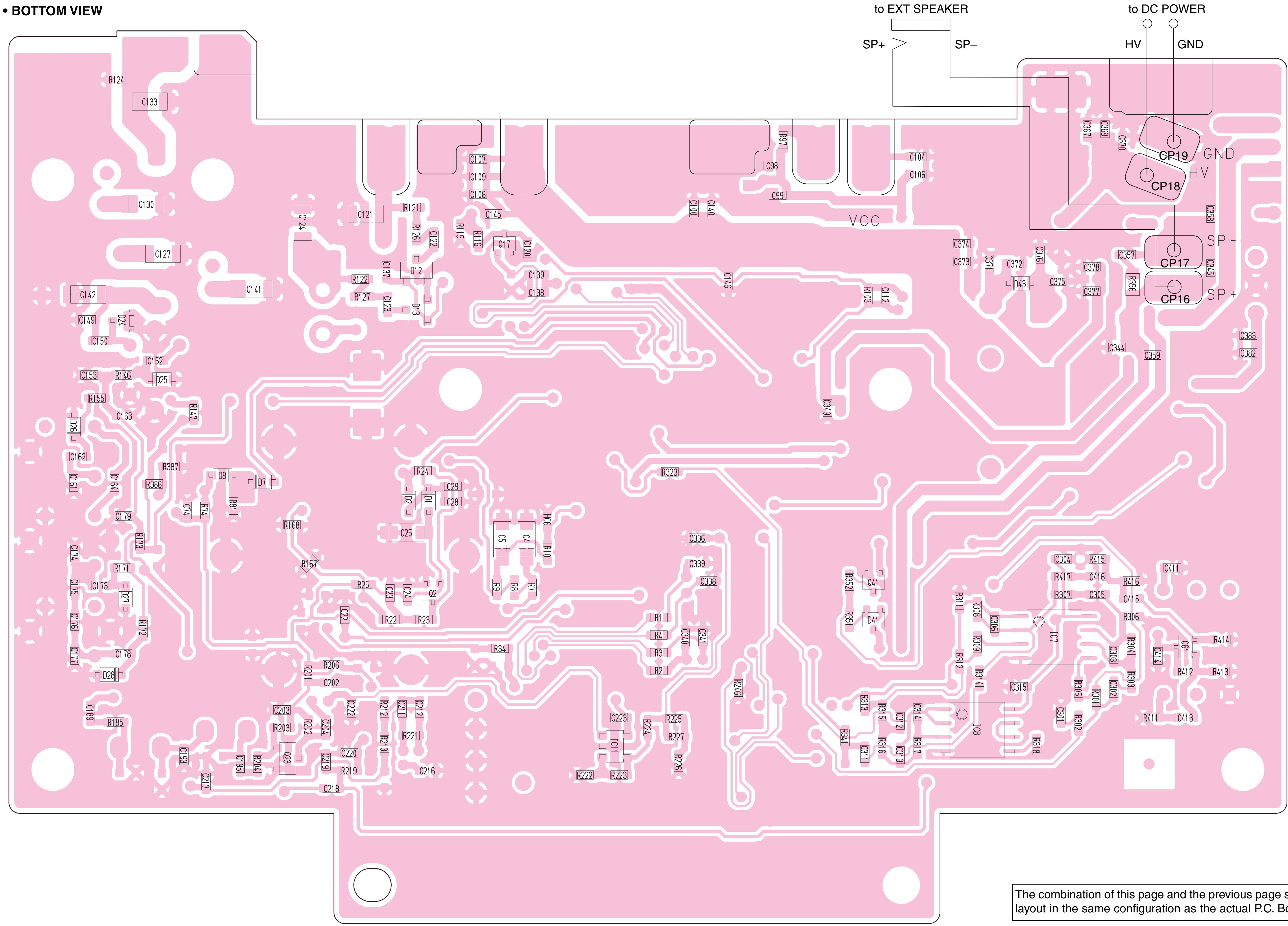
9-5 MAIN-E UNIT

• TOP VIEW

The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

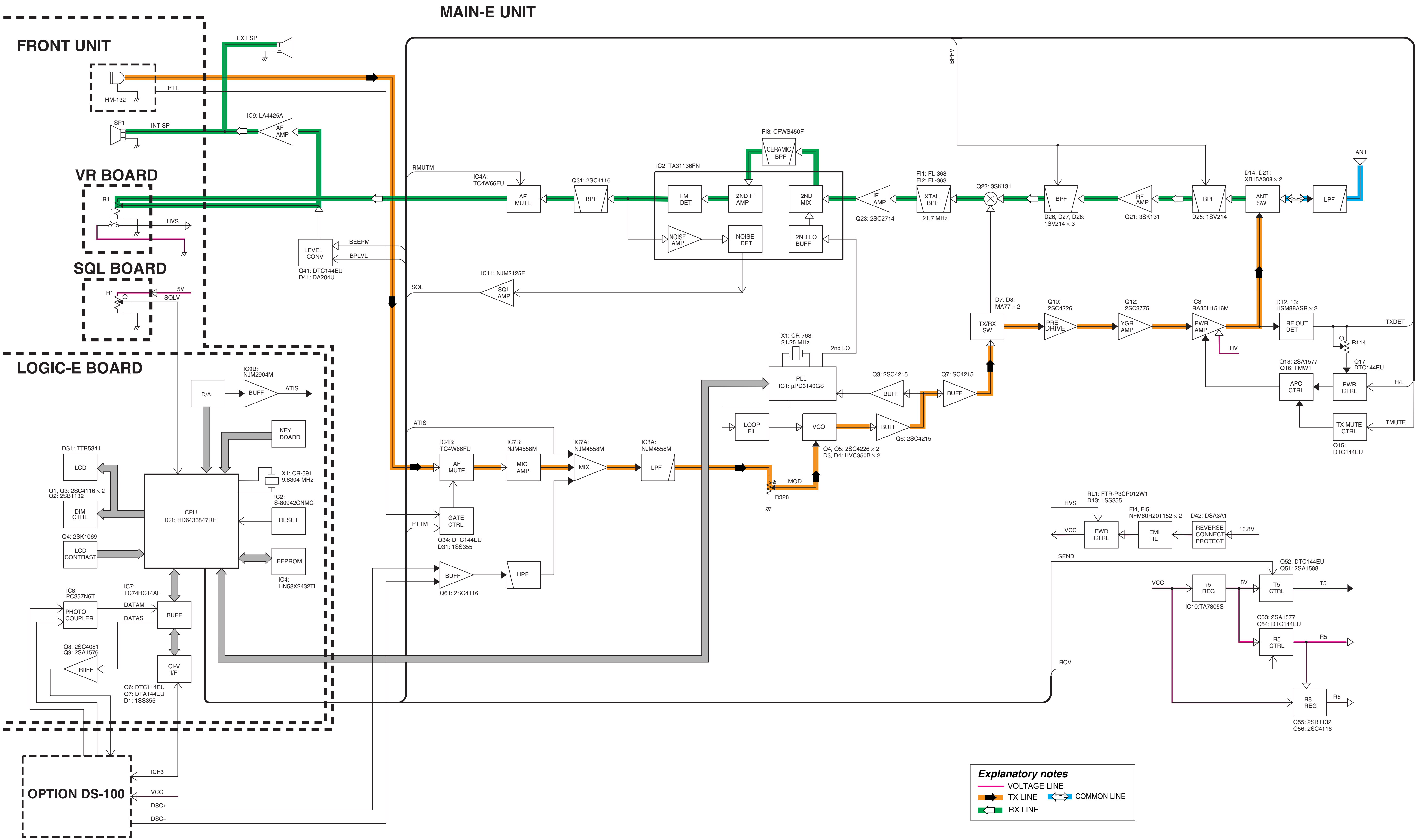


• BOTTOM VIEW



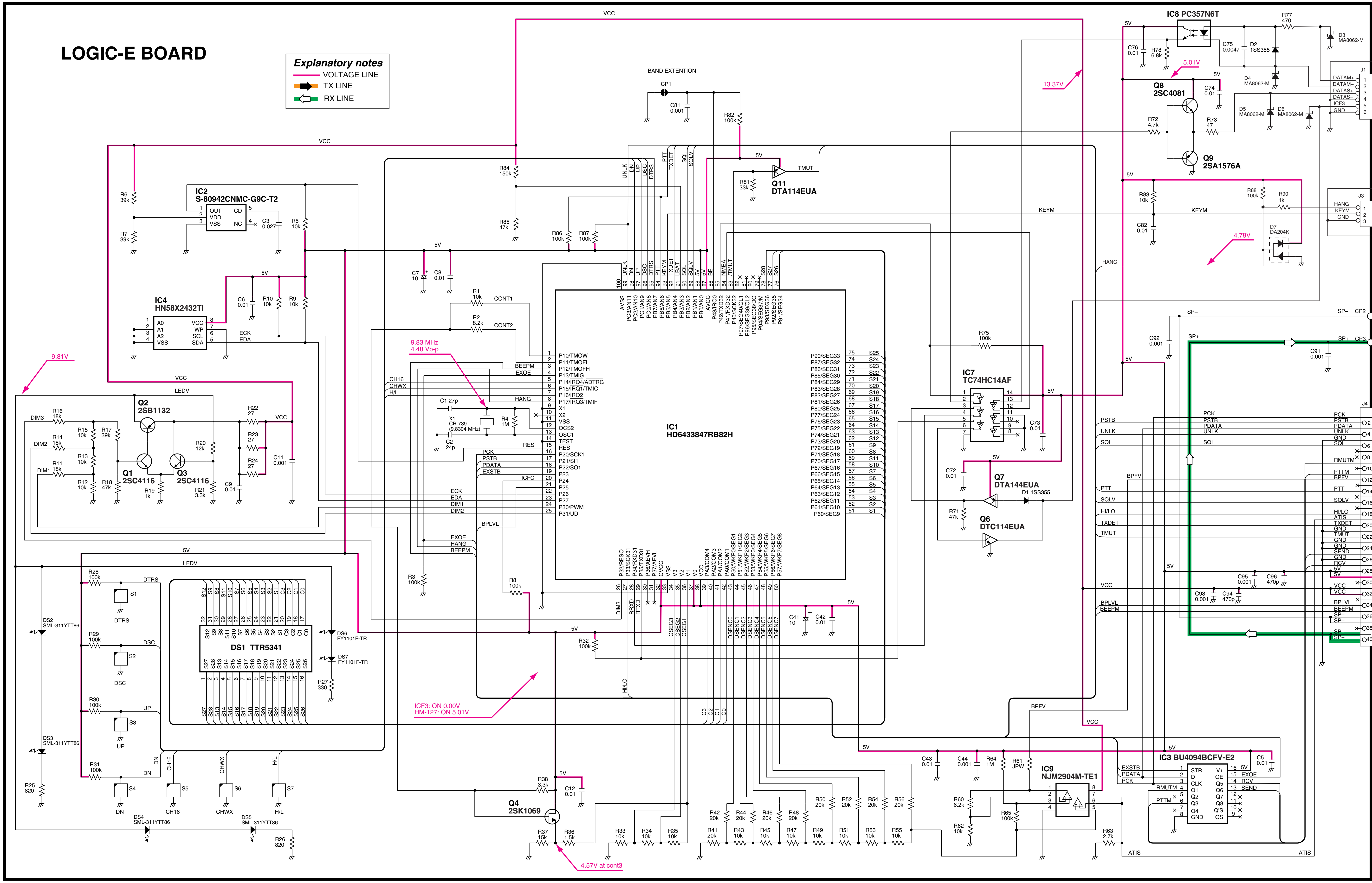
The combination of this page and the previous page shows the unit layout in the same configuration as the actual P.C. Board.

SECTION 10 BLOCK DIAGRAM

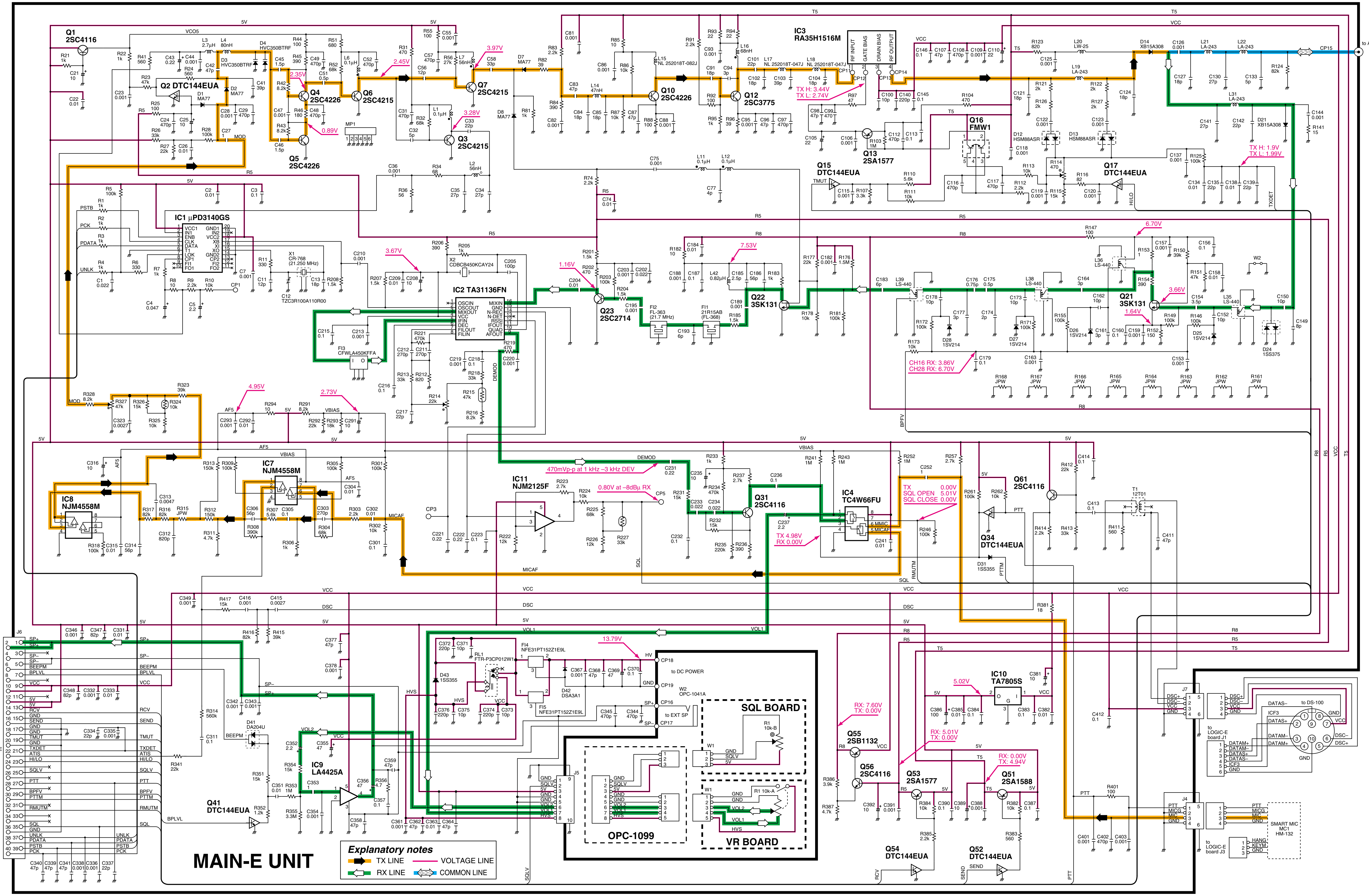


SECTION 11 VOLTAGE DIAGRAM

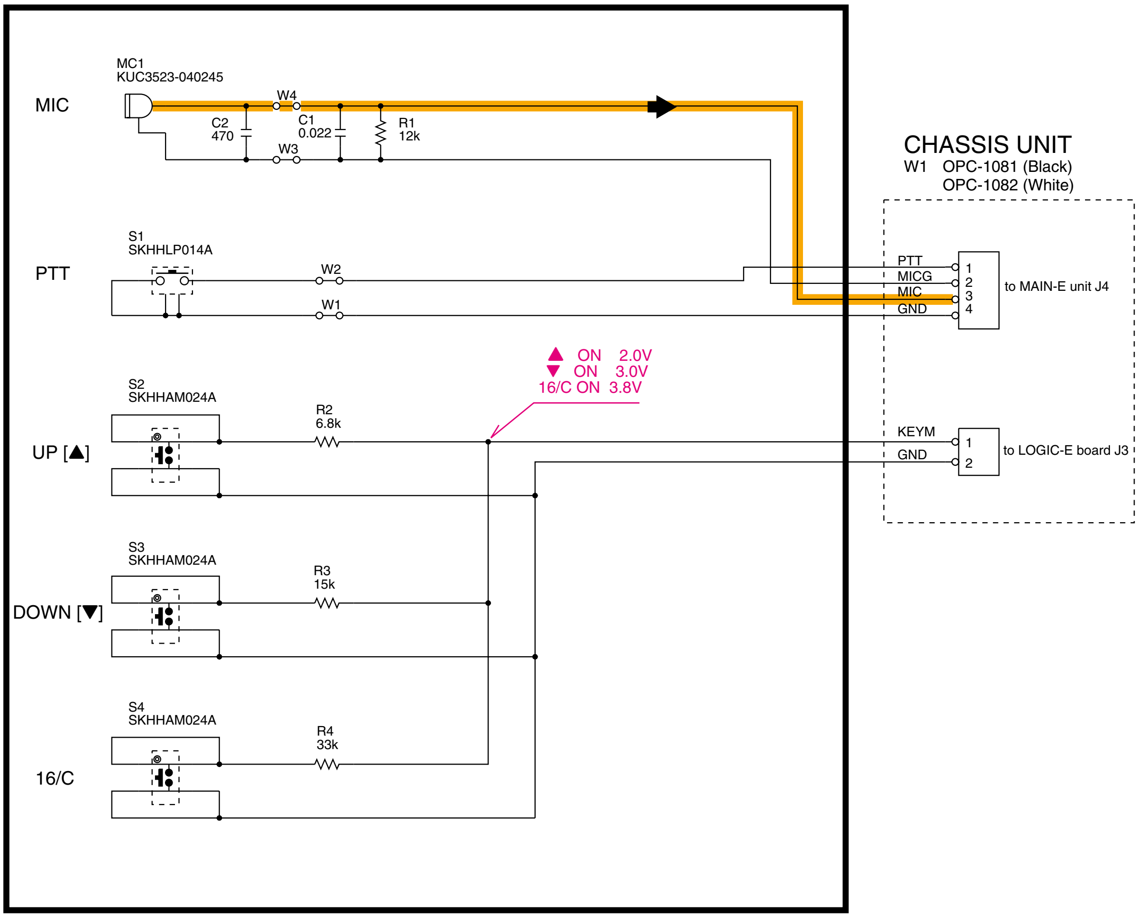
11-1 LOGIC-E BOARD



11-2 MAIN-E UNIT



11-3 HM-132



MIC
MC1
KUC3523-040245
W4
C2
470
C1
0.022
R1
12k
W3
CHASSIS UNIT
W1 OPC-1081 (Black)
OPC-1082 (White)
PTT
S1
SKHHLP014A
W2
W1
PTT
MICG
MIC
GND
1
2
3
4
to MAIN-E unit J4
▲ ON 2.0V
▼ ON 3.0V
16/C ON 3.8V
S2
SKHHAM024A
R2
6.8k
UP [▲]
KEYM
GND
1
2
to LOGIC-E board J3
S3
SKHHAM024A
R3
15k
DOWN [▼]
S4
SKHHAM024A
R4
33k
16/C

Icom Inc.

1-1-32, Kamiminami, Hirano-ku, Osaka 547-0003, Japan
Phone : +81 (06) 6793 5302
Fax : +81 (06) 6793 0013
URL : http://www.icom.co.jp/world/index.html

Icom America Inc.
<Corporate Headquarters>
2380 116th Avenue N.E., Bellevue, WA 98004, U.S.A.
Phone : +1 (425) 454-8155 Fax : +1 (425) 454-1509
URL : http://www.icomamerica.com
<Customer Service>
Phone : +1 (425) 454-7619

Icom Canada
Glenwood Centre #150-6165
Highway 17 Delta, B.C., V4K 5B8, Canada
Phone : +1 (604) 952-4266 Fax : +1 (604) 952-0090
URL : http://www.icomcanada.com

Icom (Australia) Pty. Ltd.
A.B.N. 88 006 092 575
290-294 Albert Street, Brunswick, Victoria, 3056, Australia
Phone : +61 (03) 9387 0666 Fax : +61 (03) 9387 0022
URL : http://www.icom.net.au

Icom New Zealand
146A Harris Road, East Tamaki,
Auckland, New Zealand
Phone : +64 (09) 274 4062 Fax : +64 (09) 274 4708
URL : http://www.icom.co.nz

Beijing Icom Ltd.
1305, Wanshang Plaza, Shijingshan Road, Beijing China
Phone : +86 (010) 6866 6337 Fax : +86 (010) 6866 3553
URL : http://www.bjicom.com

Icom (Europe) GmbH
Communication Equipment
Himmelgeister Str. 100, D-40225 Düsseldorf, Germany
Phone : +49 (0211) 346047 Fax : +49 (0211) 333639
URL : http://www.icomeurope.com

Icom Spain S.L
Crta. de Gracia a Manresa Km. 14,750
08190 Sant Cugat del Valles Barcelona, SPAIN
Phone : +34 (93) 590 26 70 Fax : +34 (93) 589 04 46
URL : http://www.icomspain.com

Icom (UK) Ltd.
Unit 9, Sea St., Herne Bay, Kent, CT6 8LD, U.K.
Phone : +44 (01227) 741741 Fax : +44 (01227) 741742
URL : http://www.icomuk.co.uk

Icom France S.a
Zac de la Plaine, 1, Rue Brindejonc des Moulinais
BP 5804, 31505 Toulouse Cedex, France
Phone : +33 (5) 61 36 03 03 Fax : +33 (5) 61 36 03 00
URL : http://www.icom-france.com

Asia Icom Inc.
6F No. 68, Sec. 1 Cheng-Teh Road, Taipei, Taiwan, R.O.C.
Phone : +886 (02) 2559 1899 Fax : +886 (02) 2559 1874
URL : http://www.asia-icom.com

Count on us!

Icom Inc.
1-1-32, Kamiminami, Hirano-ku, Osaka 547-0003, Japan

S-14013MZ-C2